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ERRATA.

Vol. 19, No. 2, p. 96, Clayton LANE's " Malaria : a Critical Review," para. 2, latter part of, *for* "in infecting chimpanzees both with benign and with malignant tertian malaria" *read* "in infecting chimpanzees with benign tertian malaria." In the same sentence, *for* "page 32" *read* "page 33" ; *for* "both infections" *read* " the infection."

Vol. 19, No. 1, p. 66, CLAPIER summary, for *fevrier asthenomyalgic* read *fièvre asthéno-myalgique.*

Vol. 19, No. 5, p. 390, last line, *for* " Guinea" *read* " Guiana."

TROPICAL DISEASES BUREAU

TROPICAL DISEASES BULLETIN.

Vol. 19.] 1922. [No. 1.

LEISHMANIASIS: A REVIEW OF RECENT LITERATURE.

By C. M. Wenyon,

Sectional Editor, Tropical Diseases Bureau.

I. Kala Azar.

During the past ten years very few important advances have been made in our knowledge of kala azar, with the fortunate exception of the discovery of the specific action of antimony, chiefly in the form of tartar emetic, in the treatment of the disease. We are no nearer the solution of the problem of its transmission and not many new facts of importance have been elicited. No additions to our knowledge have been made, as regards symptomatology and pathology, beyond what may be found in any up-to-date text-book, and no fresh information regarding the structure of the organism causing the disease and its development has come to light. The disease still occurs in the well-known endemic centres of North China, India, the Caspian region, Mediterranean littoral, and the Anglo-Egyptian Sudan, while new foci in Mesopotamia, Sumatra, and Siam, and in the districts around Lake Chad have been discovered. The similar and associated disease which occurs in dogs in the Caspian and Mediterranean regions, and also near Lake Chad, still requires an explanation in view of its entire absence from other endemic centres. Experimental work with animals has attracted considerable attention, but the uncertainty of producing infections has hampered the advances which this line of research was expected to yield. It has been claimed by some observers that many insect flagellates, which have been regarded as peculiar to these animals, are inoculable to vertebrates, and that infections are produced which bear some resemblance to the natural diseases of man and dogs due to leishmania. These observations would tend to confirm the view that leishmaniasis is due to an insect flagellate having invaded the vertebrate. Doubt has, however, recently been thrown on many of these experiments.

Distribution.

Assam still appears to be the most important endemic centre of the disease, and McCombie Young (1920) believes that there is a most disquieting increase in its incidence which calls for immediate action. Külz (1916) reports having found leishmania in the spleen of

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a sick Arab in the Bagdad district of Mesopotamia, and that KADIR, who continued his investigations, had diagnosed kala azar by spleen puncture in eight of twelve cases examined. Low (1919) treated a case of kala azar in England. According to him the infection was undoubtedly contracted in Bagdad, though LEDINGHAM (1919) considered it possible this had occurred in India five or six months before. The unsatisfactory accounts of the discovery of leishmania in cases of supposed kala azar in the East Indies by DE RAADT (1909), ELDERS (1909) and NEEB (1909) rendered it extremely doubtful if the disease occurred at all in the countries directly east of India. SMITS (1916) has, however, discovered *L. donovani* in six cases locally infected in Sumatra, while MENDELSON (1919) found the parasite in one case from Siam. In China the disease still appears to be limited to the district between the Yangtse and Pekin, as first described by COCHRAN (1913–14). WYLIE (1920) gives an account of 35 cases, 15 of which were diagnosed by spleen puncture, from this region.

In the Mediterranean area the distribution appears to be the whole of the littoral, along which individual centres are constantly being incriminated. Thus, PATANE (1917) has discovered a case in Libya; KLIPPEL and MONIER-VINARD (1921) have recorded the first case from Morocco, and CARNOT and LIBERT (1921) one from Macedonia. MAYER and REINHARD (1918) recorded an infection which was apparently acquired in Asia Minor. The disease, though generally occurring near the coast, may occur further inland, as in Spain. A case was recorded from Lisbon by ALVAREZ in 1910. More recently LABBÉ, TARGHETTA and AMEUILLE (1918) described two cases from Nice in Serbian refugees. They have assumed that the disease was contracted in France. GIOSEFI (1918) observed a case in Trieste. There is no fresh information about the disease in Egypt, nor in the endemic area in the Sudan bordering on Abyssinia, except for records of isolated cases since the issue of the report of the Sudan Kala-azar Commission (1911) and no fresh cases have been recorded from the districts about the Caspian Sea since GURKO's paper in 1913. In 1916 BOUILLIEZ described the first case in a child in the Lake Chad district of West Africa, while TOURNIER (1920) recorded one from the Gaboon. As regards America, the only observation is still that of MIGONE (1913), who saw a case in an Italian who had resided in Paraguay for sixteen years. It is doubtful where he contracted the disease, for he had apparently visited Italy from time to time.

Canine kala azar occurs, as does the human disease, in the Mediterranean littoral and in the Caspian region. As is well known, in certain cases dogs and children have been found infected in the same house. This close association is far from being always observed. NICOLLE (1921) finds that in the Tunis district the canine disease is more widespread than that of children. DELANOË and DENIS (1916) discovered the disease in dogs in Morocco, and it is only recently that the first human case has been seen there. PRINGAULT (1914) found that dogs were infected in Marseilles, but no human cases have been noted in this locality. NELIGAN (1913) found a generalized leishmania infection of a dog in Teheran, but kala azar in man is unknown in Persia. In West Africa the canine disease was noted by LAFONT and HECKENROTH (1915) at Dakar in Senegal. No one has yet discovered kala azar of dogs in India, nor has it been seen in America. Even if we admit that the canine disease is due to the same organism as that producing kala azar in man, it is evident that the dog does not play any essential rôle in its spread, though there is every possibility that it occasionally passes from dog to man or vice versa.

Diagnosis.

The diagnosis of kala azar depends upon the discovery of the parasite, and spleen puncture still remains the most reliable and rapid means of attaining this object. The importance of establishing the diagnosis, especially where new drugs are being tested, is well illustrated by the observation of NICOLLE (1921) in his account of the cases observed in Tunis. Spleen puncture was performed in 172 cases which were suspicious and in only 59 was a diagnosis of kala azar established. Various other methods of discovering the parasite have been advocated, and if these give positive results puncture of the spleen can be dispensed with.

1. *Direct examination of the peripheral blood.*—Many observers, including CHRISTOPHERS, DONOVAN, and especially PATTON, have demonstrated the frequency with which leishmania can be discovered in the peripheral blood of cases of kala azar. PATTON (1912) recorded the results obtained from the examination of 84 cases in Madras; in 42 of these the parasites were discovered in the first film examined, in 13 in the second, in 12 in the third, in 5 in the fourth, in 2 in the fifth, and in 4 in the sixth; in the remaining cases the parasites were not discovered till a larger number of films were examined. Similar results were also obtained by KORKE (1914) in Madras. MACKIE (1914 and 1915), from the examination of 245 cases, found the parasites in the peripheral blood of 21 per cent. of the indigenous Assamese and in 64 per cent. of the tea-garden coolies. More recently KNOWLES (1920) succeeded in 32 out of 72 cases; this result necessitated the examination of 671 blood films. In the Sudan MARSHALL (1912) observed the parasites in the blood of 80 per cent. of cases examined. In the Mediterranean disease NICOLLE and CASSUTO (1908) had observed the parasites in the blood of one case. CANNATA, in Italy (1913 and 1914), discovered leishmania in the blood of 15 out of 16 cases, an observation which required the methodical examination of 20 to 30 films from each case. Similar results were obtained by VAGLIO (1914) in 11 cases, and by RUTELLI (1914) in 7 cases.

It is evident from these results that parasites are frequently present in the peripheral blood. They are generally within mononuclear leucocytes, but may occur in other cells. Their discovery, however, appears to be not always an easy matter, and it evidently necessitates the careful examination of a series of well-prepared films from each case.

2. *Culture of peripheral blood.*—A reliable and easy method of cultivating the organism having been discovered by NICOLLE (NNN medium), it was hoped that blood culture would yield more uniform results than direct examination of the blood. MAYER and WERNER (1914) and WENYON (1914) were the first to demonstrate that cultures could be obtained by inoculating tubes of NNN medium with a few drops of the peripheral blood. ROW (1914), in India, was also successful with a more elaborate method; the blood from the finger was mixed with a citrate saline solution and allowed to deposit for 12 to 24 hours; the deposit was then inoculated into culture media. It is stated that this method obviates the addition to the medium of excess of human serum, which is detrimental to the growth of the parasite. GIUGNI (1914) and CANNATA and CARONIA (1914) also obtained successful results in Italy. CORNWALL and LA FRENAIS (1916) obtained cultures from the blood in seven cases in India. KNOWLES (1920), working in Assam, found that this culture method,

though sometimes yielding very good results, was disappointing as a reliable diagnostic procedure.

Blood culture is certainly a method which should be employed, especially in cases in which spleen puncture is contraindicated. The disadvantage is that the number of parasites inoculated to the medium is so small that often two or three weeks must elapse before flagellates are detectable.

3. *Examination of lymphatic glands.*—COCHRAN (1913) advocated the excision of a superficial lymphatic gland under a local anaesthetic. The gland is cut in half and a smear made from the cut surface. Puncture of the gland without excision did not give good results.

4. *Serum tests.*—The fact that blood serum from kala azar cases was liable to produce a copious precipitate when mixed with water was noted by BRAHMACHARI (1917). In a later publication (1920) this observer advises the addition to the serum of two parts of distilled water. A precipitate was obtained in 20 consecutive cases of kala azar and not in other diseases. RAY (1921) again describes what is undoubtedly the same reaction. To two drops of blood in a tube are added 20 drops of distilled water. In kala azar the mixture shows a turbidity and, on standing, a flocculent precipitate. It seems probable that this explains an observation made by HILL (1913) in China, who noted that in making blood counts in eight consecutive cases of kala azar it was impossible to get the blood to mix uniformly in the pipette, as the blood ran together into clumps. He described the phenomenon as a new sign in the disease. The diluting fluid was a mixture of 1 part of a methyl alcohol solution of Wright's stain with 3 parts of 0·1 solution of sodium chloride in distilled water. It seems that this peculiarity of the blood in kala azar is worthy of further investigation.

Another test which must still be regarded as in the experimental stage is the "formol-gel" reaction advocated by GATÉ and PAPACOSTOS for syphilis. The addition of a couple of drops of commercial formol to about 1 cc. of clear serum causes the mixture to jellify in 24 to 30 hours. SPACKMAN (1921) called attention to the fact that in kala azar the solidification occurred in a few seconds. NAPIER (1921) tested 50 cases of proved kala azar, and noted that solidification of the serum occurred in less than half an hour in 49 of these. In other cases tested, such as malaria, a jelly was not formed till after the expiry of 24 hours. FOX and MACKIE (1921) have devised a simple technique for this reaction. A drop of clear serum is placed on a slide, and this is inverted over a watch glass containing a few drops of formol. In a few minutes the kala azar serum will have solidified, whilst other sera remain fluid. It would appear that this test is of greater promise in kala azar than in syphilis, in which disease it is now regarded as of little, if any, value.

Many observers have attempted to devise a test for kala azar based on the presence of antibodies in the blood. The most extensive investigations are those of CARONIA (1913). He showed that suspensions of the flagellates could be agglutinated or precipitated by the serum of rabbits which had been subjected to inoculations of killed cultures. The serum of naturally infected children showed a reaction which was too feeble to be of diagnostic value, though the administration of a vaccine of killed flagellates increased the potency of their sera, as it did in rabbits. The reaction of deviation of the complement has likewise yielded discordant results.

None of the tests based on serum reactions can be regarded as a substitute for the discovery of the parasite in really scientific work.

Age of Infected Persons.

When it was discovered that kala azar existed in the Mediterranean area, and that here young children were almost exclusively attacked, this form of the disease was named Infantile Kala Azar, and the parasite causing it *Leishmania infantum*, as it was generally considered that in India the disease was essentially one of adults. More recent and careful observations have tended to demonstrate that such a distinction does not actually exist, for in the Mediterranean area adults are not immune to infection, while in India children are more often attacked than was at first supposed. MACKIE (1914) conducted a kala azar survey in the Nowgong district of Assam. The cases were tabulated as Typical, Probable, Suspicious and Doubtful. By performing spleen puncture in a certain number of each group, it was determined that all the typical and probable cases and about half the suspicious ones were actually cases of the disease. Of 195 cases which could thus safely be assumed to have kala azar, 9 were between the ages of 1 and 5, 100 between 6 and 10, 49 between 11 and 15, 17 between 16 and 20, 12 between 20 and 30, and 8 over 30. Of a series of 143 cases treated by MUIR (1917), 25 were under 6 years of age, 56 from 6 to 12, 26 from 13 to 16, 21 from 17 to 25, and 15 about 25. He remarks that kala azar is thus much commoner in children than adults. KNOWLES (1920) gives for 86 patients, all diagnosed by discovery of the parasite, an average age of 21·41 years. Fifty-eight of these cases were between 10 and 26 years of age. There was a maximum age of 40 and a minimum of 2. COCHRAN (1913), in China, found the age in 16 definitely diagnosed cases to vary from 4 to 35 years. In his account of 35 cases, 15 of which were diagnosed by spleen puncture, in the same country, WYLIE (1920) found the ages to vary from 4 to 30 : all of these were males, a fact which is easily understood in view of the known reluctance of the Chinese to allow their women to be seen. In the region of the Caspian it is known that the disease attacks chiefly children and young adults. GURKO (1913) describes four cases from this area. Their ages were 6½, 6¾, 16, and 19. In the Sudan, MARSHALL and THOMSON (1911) found that kala azar occurs in persons of 12 years of age and upwards. In the whole of the Mediterranean region the disease is undoubtedly most common in young children, as all the records show. Adults, however, are occasionally attacked. TASHIM (1910) recorded two cases from Tripoli in persons 11 and 18 years of age. GABBI (1909) saw the disease in a youth of 18, a man of 38, and three boys of 13. SPAGNOLIO (1911) saw a case in a man of 35. Similarly, cases in adults have been described by FULCI and BASILE (1911), CHRISTOMANOS (1911), ARCHER (1907), BASSETT-SMITH (1913), TRANTAS (1915), WARD (1916), KERR (1918), CARNOT and LIBERT (1921), and others. It is thus evident that the Mediterranean disease attacks adults and the Indian disease children as in other endemic areas, and it can no longer be maintained that infantile kala azar is distinct from that of India. This conclusion is borne out by all the clinical features of the disease and the character of the organism producing it.

Treatment.

The greatest advance has been made in the treatment of the disease. To GASPAR VIANNA (1913) is due the credit of first bringing to the notice of the medical world the specific action of tartar emetic in cases of South American cutaneous leishmaniasis. His observations were quickly confirmed, while, in Italy, DI CRISTINA and CARONIA (1915) discovered that the drug was equally efficacious in the treatment of kala azar. ROGERS (1915) was the first to employ the drug in India. Since then it has been used on a large scale and has given most satisfactory results. It is now recognized as the accepted method of treatment, and though attempts have been made to discover more easily administered or less toxic substitutes, tartar emetic and its corresponding sodium salt are still the only remedies which are generally employed.

Tartar Emetic. India.—In a letter to the *British Medical Journal* for July 31, 1915, ROGERS reported that he had been using tartar emetic in the treatment of kala azar in India with promising results. Accounts of the success of this form of treatment were contained in two papers by ROGERS (13 cases) and MUIR (9 cases) which appeared in the October number of the *Indian Medical Gazette* for 1915. Of the 13 cases treated by ROGERS, 8 were either cured or improved, while 4 either had not changed or were worse, and 1 had died. MUIR reported that 8 of the 9 cases treated by him had shown uniform and rapid improvement, while one had died of phthisis. In both series of cases the diagnosis had been established by spleen puncture and discovery of the organism. ROGERS and HUME (1916), and ROGERS (1916–17) gave details of the treatment of 35 Europeans, 6 of which were children. Diagnosis was made by discovery of the parasite in all of these, except 5 of the children in which the symptoms were sufficiently characteristic to justify the diagnosis of kala azar. Of the 35 cases, 26 were reported as cured, and 8 improved, while one died from phthisis. The cases which were recorded as improved were either still under treatment, or had left hospital prematurely. There had been no known relapse amongst those considered as cured, the majority of which had either been seen or heard of for several months up to a year after discharge from hospital. ROGERS (1917) gave the results of the treatment of a series of 13 natives of India, and leishmania was seen in all but one of these. Eight were stated to have been cured, three much improved, and two to have shown no change. In 19 of the cases in which parasites had been discovered and a second puncture of the spleen was performed when cure was considered to have taken place, it was found that leishmania was no longer present. ROGERS noted that treatment had to be continued for some time after apparent recovery had taken place, and that the results fully confirmed the sanguine expectations aroused by his previous experience.

After ROGERS had introduced the tartar emetic treatment in India it was adopted by other observers. MUIR (1916) gave an account of the treatment of a series of about 100 cases, and in 1917 another series of 143 cases, all in natives. In the first series, it is stated that the diagnosis had been made by spleen puncture in the majority of the cases, and, though no details are given, that all cases recover absolutely if treatment is begun before the last stage of the disease is reached. More details are given of the second series of 143 cases. Spleen puncture confirmed the diagnosis in 72 of these, as there was some doubt as to the diagnosis. In the remaining cases the clinical features and blood condition made the diagnosis so clear, that spleen puncture was not performed. Of the 143 cases, all but 46 were discharged as cured. Of the latter, 13 died and 33 discontinued treatment of their own accord, and of these 29 did so because their relatives considered that a cure had already occurred. MUIR remarks that it is safe to conclude that of the 143 cases, 126 were either cured or would have been cured if the full course of treatment had been taken.

Another series of 86 cases in which diagnosis was confirmed by finding of the parasite and where tartar emetic treatment was employed is described by KNOWLES (1920). Of the 86 cases, 46 were discharged as cured. In 31 of these, a spleen puncture performed before discharge had failed to reveal any parasites. Of the remaining cases, 11 were progressing favourably towards recovery, while six had absconded before the treatment was completed. One case was evidently dying, and 22 had actually died. The deaths were due to influenzal pneumonia, 6 ; acute dysentery, 5 ; asthma and cardiac failure, 5 ; nephritis and cardiac failure, 2 ; and broncho-pneumonia, dysentery and nephritis, 4. Some of those who died of influenzal pneumonia were already cured of their leishmania infection. Good results following the use of tartar emetic in properly diagnosed cases were reported by MACKIE (1915) one case, BRAHMACHARI (1915) a few cases, GHOSH (1916) four cases and JACKSON (1916) one case, while LOW (1919) recorded the treatment of a case which had apparently contracted the disease in Mesopotamia. Death from influenzal bronchopneumonia unfortunately occurred when cure had taken place.

In Assam treatment by means of tartar emetic has been adopted on a large scale and records of the success of the treatment are accumulating. In most of these no statements as to the discovery of the parasite is made, so that it is possible that other diseases than kala azar may have been occasionally included. Owing to lack of hospital accommodation and other causes many cases are being treated as out-patients, as mentioned by MUIR (1917). KUNDU (1920) writes of the popularity of the tartar emetic treatment amongst natives in Assam. At the time of writing 45 cases were being treated as out-patients and 16 as in-patients at Nowgong. The treatment of out-patients is unsatisfactory, as the people cease to attend as soon as the initial improvement has taken place, whereas in order to effect a cure treatment must be prolonged.

In 1918 ROGERS recorded the fact that he had completely given up the use of tartar emetic in favour of the corresponding sodium salt—sodium antimonyl tartrate—on account of its lesser toxicity. This salt of antimony had been used by BRAHMACHARI (1916) and GHOSH (1916), with favourable results. ROGERS concluded that it is at least as effective and probably more so than tartar emetic. DODDS-PRICE (1920) has given over 3,000 injections himself, and has watched the effect of twice this number given by his assistants, in Assam. In most cases tartar emetic was apparently used, but he calls attention to the superiority of the sodium salt. He concludes that in these salts we possess the means of curing the vast majority of cases of kala azar, provided treatment is commenced in the early stages of the disease. ELWES (1920) also writes of the good results of the tartar emetic treatment, but agrees that the sodium salt is to be preferred.

It is evident from the above accounts that by the use of tartar emetic or the corresponding sodium salt there is every prospect of bringing about a cure in Indian kala azar, provided the treatment is commenced early enough and is continued for a sufficient time after improvement has taken place. Since its first employment much has been learnt as to the best method of giving the drug and the length of time it is necessary to continue the treatment. In 1917 ROGERS pointed out that the maximum dose required to destroy the parasites, when given every third day, or twice a week, over two or three months, is about 1 cc. of a 2 per cent. solution for every 10 lb. of body-weight. The maximum dose for a European, however, must not exceed 10 cc. and for an Indian

7 cc. This maximum dose must only be reached gradually after commencing, in persons of 12 years of age and upwards, with about 5 cc. if there is no debility. In children and old people the initial dose must not exceed one-third of 1 cc. per 10 lb. of weight. Cases were defined as cured when the fever had completely ceased for two or more months, when there had been considerable gain in body-weight, and a restoration of the blood, and especially of the white corpuscles, to the normal, and a decided diminution in the size of the spleen.

Attention was drawn to the toxic effects of tartar emetic. It was realized that great care had to be exercised in administering the drug, and that it was necessary to commence with small doses and gradually to increase them. Three deaths following injections of tartar emetic are mentioned, but in these cases it was found that the solution contained a white precipitate. ROGERS (1919), however, recorded a case which died as a result of the toxic action of the sodium salt. The necessity of using only perfectly clear solutions is emphasized.

MUIR (1916–17) stated that injections should be given every second day till fever had been absent for a month and then once a week for two to four months. Unless these weekly injections are continued relapse may occur.

Some very interesting facts were elucidated by KNOWLES (1920) during his experiences in Shillong with tartar emetic. The first effect of treatment is the immediate disappearance of parasites from the peripheral blood. The second result is their gradual disappearance from the spleen, while the third is the cessation of fever. At the same time there is a steady increase in body-weight, decrease in size of the spleen, and a return of the blood picture to the normal. The rate of disappearance of parasites from the spleen varies, but, speaking generally, they may be said to become scanty and difficult to find after 100 cgm. have been given, while after 200 cgm. a cure is assured. That the parasites are still alive after considerable doses have been given is proved by the fact that cultures were obtained after the administration of 18, 31, 49, 89 and even 174 cgm. The spleen steadily diminishes in size and may even become impalpable. This latter result is not always seen, for the spleen may still be palpable even in cases which have evidently been sterilized of their infection. During treatment the liver may actually increase in size, and it is suggested that this may be a result of accumulation of tartar emetic in the tissues. The directions given by KNOWLES (1920) for the administration of tartar emetic as practised at Shillong are as follows :—

> " (*a*) The potassium salt is the one used at Shillong ; and the ' heavy powder ' should alone be used ; not the ' light powder.'
>
> " (*b*) The solution is of strength 1 per cent. in normal saline ; autoclaved at 110° C. for ten minutes, and kept in a rubber-capped flask.
>
> " (*c*) If there be the least trace of deposit or opalescence in the solution it must be discarded, and is not safe to use.
>
> " (*d*) Beginning with an intravenous dose of 3–4 c.c. for an adult, the injections are given on alternate days, and the dose gradually raised to 10–12 c.c, above which dose it is not advisable to go. At first the full effect of the injection seems to fall upon the parasites ; later, as the patient becomes cleared of infection, the tissues seem to become *more* susceptible to the drug. There is little, if any, evidence of acquired immunity to antimony, and there may be, to some extent, accumulation in the liver. Hence, towards the end of treatment the dose should *not* be pushed and the intervals between doses should be increased.
>
> " (*e*) The standard course at Shillong is a course of 200 cg., distributed over a period of two and a half to three months. . . .

"(*f*) The injections should not be given within two hours of a meal.

"(*g*) Accessory treatment by tonics and the clearing of any helminthic infection is essential. Sodium morrhuate is useful in fattening patients.

"(*h*) In the presence of complications the tartar emetic should be continued, unless there are very serious contra-indications. In a recent case, where a child appeared for ten days to be *in extremis* with what seemed to be the terminal dysentery, the injections were continued and the child made a good recovery at the time. . . . Nephritis is the most difficult complication to treat, but as the nephritis is the result of interstitial fibrosis of the kidney from parasite infection, the injections should be continued cautiously. In brief, complications are an indication to reduce the dose and proceed cautiously, but do not necessitate the abandonment of treatment.

"(*i*) The state of the heart and the examination of the urine should be attended to. The sudden appearance of oedema may be a danger signal. In giving the injections at Shillong, as also in doing spleen puncture, pituitrin and adrenalin are kept handy, although there is hardly ever any occasion to use either drug.

"(*j*) No accidents, sepsis, thrombosis, phlebitis or other ill effects have been seen. The use of a rather large needle (20 c.c. Roux syringe needle) seems better for intravenous work than that of a very fine needle, as it is easier with the former to make certain of being in the lumen of the vein. Count 'eight' slowly over the injection of each c.c. The 2 per cent. solution—to judge from one or two cases treated with it before arrival at Shillong—seems more liable to cause local irritation if the vein be missed. This is not seen with the 1 per cent. solution."

Mediterranean area.—As already pointed out, tartar emetic for the treatment of kala azar was originated by DI CRISTINA and CARONIA (1915) in Italy. In their first paper they describe the treatment of 10 cases, the ages of which varied from 15 months to 6 years. The solution used was a 1 per cent. tartar emetic, which was injected with a fine needle into the median basilic, external jugular, or temporal vein. The commencing dose was 2 cgm., and this was increased to 10 cgm. Of the cases cured the eldest child received 84, and the youngest 35 cgm. Two cases which were in the final stage of the disease died soon after treatment was commenced, while a third died of acute nephritis. The remaining 7 cases were either cured or were reported as progressing so favourably that a cure was ensured.

JEMMA (1916) announced that he had obtained a cure in 21 out of 26 cases in Naples, while SPAGNOLIO (1916) recorded the successful treatment of 4 cases. The most extensive series of Italian cases consisted of 110, which were treated at JEMMA's clinic in Naples, between October, 1913, and July, 1920, an account of which has been given by JAVARONE (1920) and FOTI and JAVARONE (1921). This series evidently includes the 26 cases originally reported by JEMMA. In all a diagnosis had been made by spleen puncture. The most noticeable feature of this series is the difference in the mortality-rate before and after the introduction of the tartar emetic treatment—whereas recovery had been the exception, it now became the rule. Of the 110 cases, 63 were treated by tartar emetic, with 49 recoveries and 14 deaths. A 1 per cent. solution of the drug was used, and was run into the vein from a graduated burette. For children aged 3 the first dose is 2 cc., and this is increased to 3, 4 and 5 cc. In older children the dose is 2 to 3 cc., increased to 6 or 7 cc. At least two clear days must elapse between each injection. The treatment must be continued for 40 or 50 days, during which 30–50 cgm. of the drug is given. The deaths were due in all cases to intercurrent maladies either during or after treatment. Some of those who died were actually cured of the leishmania infection. As was to be expected, the mortality-rate was highest amongst the youngest children.

An attempt to treat 43 children in an out-patient department was described by Longo (1917). The results were far from satisfactory owing to the unwillingness of the parents to submit their children to the prolonged course of treatment.

TREATMENT OF KALA AZAR BY TARTAR EMETIC.

Observer.	No. of Cases.	Diagnosed by discovery of parasite.	Cured.*	Improved (treatment in progress).	Spleen puncture negative after treatment.	No improvement, or treatment not completed.	Deaths.	Death, but leishmania infection apparently eradicated.
				INDIAN CASES.				
Rogers, 1915	13	13	8	—	—	4	1	—
Muir, 1915..	9	9	—	8	—	—	1	—
Rogers & Hume, 1916	6	6	5	—	6	—	1	1
Rogers, 1916	12	11	8	4	5	—	—	—
Rogers, 1917	17	12	15	2	—	—	—	—
Rogers, 1917	13	12	8	3	8	1	—	—
Muir, 1917..	143	72	97	—	—	33	13	—
Knowles, 1920.. ..	86	86	46	11	31	7	22	2
Mackie, 1915	1	1	1	—	—	—	—	—
Ghosh, 1916	4	4	4	—	—	—	—	—
Jackson, 1916	1	1	1	—	—	—	—	—
Low, 1919 ..	1	1	—	—	—	—	1	1
				MEDITERRANEAN CASES.				
Di Cristina & Caronia, 1915.. ..	10	10	5	2	—	—	3	—
Jemma, 1916	26	26	21	—	—	—	5	—
Spagnolio, 1916.. ..	4	4	4	—	—	—	—	—
Foti & Javarone, 1921	63	49	—	—	—	—	14	8

The data are insufficient to admit of a precise statement of the period of observation after treatment.

It is quite clear that tartar emetic is just as specific in the treatment of the kala azar of the Mediterranean area as it is in India. The difficulties of carrying out continued intravenous medication in young children make it all the more desirable that some simpler method of administering antimony should be discovered. Furthermore, it has been shown that in some cases death has resulted from administration of tartar emetic. Some individuals react badly to the drug, so that it is necessary to commence with small doses and gradually work up to the maximum, a careful watch being kept on the patient after each injection. Shortly after a dose has been given a cough very frequently is developed. In other cases there may be definite rigors, rise of temperature, vomiting, and diarrhoea. Some patients complain of rheumatic pains and a general feeling of depression. It is most important, however, when once the course has been commenced to continue it till recovery has taken place, as pointed out by Rogers, Muir. Knowles. and others.

Other compounds of antimony.—Though it is generally admitted that the majority of cases of kala azar can be permanently cured by means of tartar emetic, the fact that injections of this drug are not entirely free from unpleasant consequences has led to the trial of other antimony derivatives.

Paraacetyl amidophenyl stibinate of sodium.—The introduction of this salt, which is known by the name *Stibacetin*, in the treatment of kala azar is due to CARONIA (1916). The drug, which was first prepared in Germany, is easily soluble in water, and contains about 33 per cent. of antimony.* The solution must be prepared fresh. It was tried by intramuscular injection in four cases in Italy. For children under two years of age an initial intramuscular injection of 3 cgm. was given, and was increased to 10 cgm. In older children the dose ranged from 5 to 15 cgm. The injections can be given every second day into each buttock alternately. Of the four cases a boy aged 3½ years had completely recovered after three months' treatment, during which he received 3·6 gm. of the drug; a girl aged 23 months was cured by 9 injections in the course of 16 days, and another aged 12 months by 6 injections in 10 days; in the latter case an abscess formed after an injection of 12·5 cgm.; the fourth case, a boy of 17 months, improved considerably, but died from an abscess in the lumbar region, which was present before treatment was commenced. The treatment of a single case, with favourable result, was reported by KHÀRINA-MARINUCCI (1916). Under the name of *Stibenyl*, which is said to be a closely allied compound, but which is undoubtedly *Stibacetin*, BRAHMACHARI (1921) reports the use of this drug in two cases. In one it was given intravenously, in the other intramuscularly. The doses varied from 0·1 to 0·3 gm. It is not known if a permanent cure was effected. MANSON-BAHR (1920 and 1921) had good results in one case by the intravenous method, while in another a dose of 0·4 gm. produced vomiting and diarrhoea, the patient ultimately dying of amoebic dysentery. Leishmania, proved by culture to be living, were still present in the organs at post-mortem examination. In spite of reports he has received of alarming symptoms following the use of this drug (undoubtedly an impure form of *Stibacetin*) in India, he still believes that this compound holds out better prospects for the treatment of kala azar than tartar emetic or the sodium salt. The experience on which this statement is made is, however, not very extensive.

FOTI and JAVARONE (1921), in Italy, used *Stibacetin* in 10 cases. Eight were treated by intramuscular injections and two intravenously. For intramuscular injections they commenced with a dose of 3 cgm. in the form of a solution (2 cgm. in 1 cc. of cold distilled water). The injections are given at intervals of two days, and the dose is increased to 10 cgm. The duration of treatment is longer than when the intravenous method is employed, but this disadvantage is compensated for by the ease of administration. The drug must not be given subcutaneously, as it causes necrosis. Of the 10 cases treated seven were cured and three died.

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* The following information has been kindly supplied by Dr. T. A. HENRY, of the Wellcome Chemical Research laboratories :—

Stibacetin—Sodium paraacetylaminophenylstibinate, $C_{24}H_{25}O_{10}N_3Sb_3Na$, contains theoretically 40·12 per cent. of antimony. The form of *Stibacetin* sold as *Stibenyl* in this country in May 1920 contained 34·85 per cent. of antimony, and that now on sale, which is advertised as Von Heyden's, contains 33·16 per cent. Two different batches contained 32·54 and 33·79 = mean 33·16. Sodium antimonyl tartrate, $C_4H_4O_7SbNa,\frac{1}{2}H_2O$, contains 38·06 per cent. of antimony, and the commercial salt as made for use in medicine is pure. Potassium antimonyl tartrate, $C_4H_4O_7SbK,\frac{1}{2}H_2O$, contains 36·14 per cent. of antimony, and the commercial salt is pure.

All the foregoing percentages are expressed as percentages of metallic antimony for the formulae as given, including water of crystallization where shown in the formulae.

The number of cases treated with *Stibacetin*, all of which were properly diagnosed, cannot compare with the large number in which tartar emetic has been successfully employed, but it is evident that the drug has a similar action; and if it can be administered intramuscularly, we have at any rate a method of treatment which is more suitable for the handling of the disease in young children, in whom intravenous injections are difficult to carry out. So far, however, there is no evidence that it is more potent than tartar emetic.

Colloid antimony sulphide.—BRAHMACHARI (1917) stated that he had tried colloidal sulphide of antimony, both intramuscularly and intravenously, in the treatment of kala azar. As the results were disappointing he discontinued its use. ROGERS (1919) gave a more detailed account of the treatment of 10 cases of undoubted kala azar by means of this drug. The method of preparation is fully described. Doses up to 20 cc. of a solution slightly weaker than 1 in 500 were given repeatedly by the intravenous route without the least toxic symptoms. The results of this treatment were excellent, and the 10 cases, which received from 8 to 37 cgm. of the drug, were all cured. The advantages of this drug over tartar emetic are said to be its lower toxicity, the more rapid gain in weight of the patient, and the smaller quantity required to effect a cure. ROGERS regards it as a distinct improvement on the soluble antimony tartrates in the treatment of kala azar.

Other compounds of antimony.—BRAHMACHARI, who has experimented with a large number of antimony preparations, reports good results following the intravenous use of metallic antimony in suspension and colloidal metallic antimony. Of the former preparation he says it is the strongest preparation of antimony for the treatment of kala azar, being superior to any others that were tried before its use. Another drug used by this observer is hyper-acid antimonyl tartrate (+ urethane). The highest dose was 5 cc. of a 2 per cent. solution given intramuscularly. The use of this strength was not free from pain. A 1 per cent. solution, however, is almost painless. Of this drug he writes that it is one of the greatest advances in the treatment of kala azar. This investigator (1915–17) also reported the treatment of two cases of kala azar by intravenous injections of formaldehyde. The drug was said to act like a specific, but, curiously enough, he states that he has not been able to give it a further trial though we know from his publications that he has been conducting further investigations on the treatment of kala azar with other antimony derivatives, of which, in 1921, he has given an account. None of them has given results superior to those obtained with tartar emetic. It is evident, therefore, that though he has reported so very favourably on some of the drugs he has used, he is not satisfied with his own results, as he is still passing on to new compounds of antimony. In no instance reported has any of these drugs been used in a large enough series of cases to justify the deductions made as to their value; and it is to be regretted that before further experimentation with new derivatives, those so favourably judged have not been fully tested.

Animal Experiments.

One of the great hindrances to the satisfactory study of the method of spread of kala azar is the lack of an animal which is susceptible to the disease. It may safely be affirmed that if strains of leishmania were as readily inoculable to animals as are the pathogenic trypanosomes, our knowledge of the etiology of the disease would be considerably more advanced than it is at present. Both the Indian and Mediterranean viruses are inoculable to dogs, monkeys, rats and mice, but the infections are produced only after inoculation of large doses of virus, and then with no degree of certainty. When infection takes place it is of a chronic nature, and though parasites are sometimes numerous in the organs, at other times they are very scanty and difficult to detect. Recent investigations have done nothing in the way of solving this problem. It results, therefore, that it is very difficult to test the infectivity of any invertebrate host which may be suspected of transmitting the disease. Dogs and monkeys appear to be the most susceptible animals, and they have been infected with the virus obtained both from man and from naturally infected dogs. It is possible, by inoculating larger doses of virus from animal to animal, to maintain any particular strain. LAVERAN (1920) has shown that in the passage of a virus through mice the virulence gradually decreased. Mice, in some instances, were found to be infected two years after inoculation. Rats appear to be more difficult to infect than mice, and guinea-pigs and rabbits still more so. There is apparently no difference in the infections produced in animals by the Indian and Mediterranean viruses.

Interesting experiments with the virus of kala azar were made by Row (1912–13). By inoculating a monkey in the skin of the head by scarification with virus from the spleen of a case of kala azar, nodules were produced after an incubation of three to five months. In these leishmania were present and there was no sign of a general infection. Similar lesions were produced in another monkey by the subcutaneous injection of cultures. The material from one of these nodules injected into the skin reproduced the local lesion only, while a general infection was produced in those monkeys injected intraperitoneally. It thus appears that *Leishmania donovani* produces local cutaneous lesions or a general infection according to the method of inoculation. KORKE (1914) repeated Row's experiments, with similar results. He found, however, that in some cases in which the local skin lesion had resulted from cutaneous inoculation there existed also a generalized infection, while in others only a generalized infection developed after inoculation in the skin. Infections are more readily produced in animals by injecting the virus from a man or other animal than by cultures of the organism.

Transmission.

The problem of the transmission of kala azar still requires solution. In the Mediterranean area it is supposed by BASILE that the flea is the vector, but it must be admitted that no further proof of this is forthcoming. This observer claimed to have followed the development of *Leishmania donovani* in the flea, and to have successfully transmitted the disease from infected to healthy dogs by means of these insects. Several other observers recorded successful experiments of the same kind. On the other hand, certain investigators (DA SILVA, 1913; WENYON, 1914) failed entirely to obtain any development in fleas and were unable to effect a transmission of the disease. The fact that fleas are very liable to have a flagellate infection of their own renders it difficult to trace the development of leishmania in these insects. Furthermore, it is not an easy matter to exclude an infection in a living dog, so that in the apparently positive transmission experiments it is always possible that the supposed healthy dogs had already a latent infection. In such experiments, in which it may take several months for an infection to reveal itself in the animals employed, the exclusion of other sources of infection during the experiment is almost impossible. In a recent paper BASILE (1920) reviews the present position of this subject and restates his views. He claims to be able to distinguish the natural flagellates of the flea from those which develop from the leishmania ingested. Moreover, he states that the developing leishmania eventually produce cysts in the hind gut of the flea, as does the natural flea flagellate, and that kala azar may be acquired not only by the flea inoculating leishmania at the time of biting, but by an individual ingesting the encysted forms passed in the faeces of the flea. These and other statements made by this author are highly speculative, and lack the necessary experimental proof. He brings forward no convincing evidence in favour of the flea transmission hypothesis, and no facts which would exclude the fallacies of his earlier experiments.

On the transmission of kala azar in India recent investigations have thrown little light. Numerous insects have been investigated, and of these the bed bug has claimed the most attention. It is well known that PATTON first demonstrated that in the stomach of the bug leishmania are able to develop to the flagellate stage and undergo a multiplication. It was claimed by other observers that this development did not prove that the bug was the true host, and that the development took place probably because the stomach of the bug was acting as a culture tube. This was borne out by the fact that other flagellates are able to undergo a temporary multiplication and development in the bug's stomach. CORNWALL and LA FRENAIS (1916) showed that the flagellate forms of *L. donovani* could survive for at least 29 days in the intestine of the bug. In a recent paper PATTON and RAO (1921) have investigated the persistence of leishmania in the gut of the bug by making cultures on NNN medium at intervals after feeding. From a bug which had fed on cultures of *L. donovani*, and had had no subsequent feed, a culture was obtained from the mid-gut on the thirty-first day, while from another bug a culture from the hind gut was made on the thirty-fourth day. A culture was obtained from the mid-gut of a bug which had fed on cultures 41 days before and had had subsequent feeds of blood. It is thus evident that the parasite of kala azar can survive for at least 41 days in the gut of the bug, and this fact might suggest that the bug is the host of the parasite. That this is not necessarily the case is proved by the experiments of PATTON, LA FRENAIS and RAO (1921), who found that *Leptomonas pulicis* and *Crithidia ctenocephali* of the flea and *Herpetomonas muscae domesticae* could also survive for many days in the bug, the latter flagellate for at least 45 days. The forms of the parasite which occur in the bug are similar to those which are found in cultures in NNN medium. CORNWALL and LA FRENAIS (1916) described a certain form of the parasite which occurred as the "*thick-tailed*" *flagellate*. It is a rounded body, 5μ to 6μ in diameter, and has a long flagellum four or five times as thick as that possessed by the ordinary form.

Further observations on the behaviour of *L. donovani* in bed bugs were made by Helen ADIE (1921) in India. This observer fed bugs on spleen pulp from cases of kala azar. The appearances recorded occurred in certain bugs which had died after feeding, and had been left in saline solution in an incubator for a few days before being examined. In these bugs it was found that an active multiplication of the flagellates had taken place, and that this had occurred not only in the cavity of the gut, but also in the cells lining it. It is supposed that the flagellate, probably the thick-tailed form of CORNWALL and LA FRENAIS, enters the cell and becomes eventually a large multinucleated sphere, which segments into a number of daughter forms. This intracellular development is compared with the intracellular development of *Trypanosoma lewisi* which occurs in the cells of the flea's gut. It is unfortunate that satisfactory evidence of a similar development was not obtained in living healthy bugs, though large numbers were examined. It is impossible to resist the conclusion that this development was merely another form of culture which had taken place in the dead and degenerate cells. The figures purporting to depict the various stages of this development are far from satisfactory, so much so that in many cases it is impossible to recognize the bodies as leishmania at all. Those which are intended to show the multiplication of leishmania by schizogony can equally well be interpreted in another manner. They might even be stages of schizogony of some sporozoon; and that other parasites might be present is borne out by the fact that nematode larvae are also depicted as occurring in these bugs. It may safely be accepted, therefore, that the bed bug hypothesis of the transmission of kala azar is still unproved.

Several observers claim to have observed leishmania in the faecal mucus of kala azar cases. KNOWLES (1920) examined mucus from such cases, and though he saw bodies having a certain resemblance to leishmania they were so atypical that he was quite unconvinced as to their leishmanial nature. The examination of ankylostomes and their larvae hatched from eggs from kala azar cases by this observer failed to throw any light on the problem. The method of transmission of kala azar is still a mystery. ARCHIBALD (1914), who succeeded in infecting a monkey by feeding it on kala azar spleen material has suggested that infection may be carried in water, but there is no evidence of this. It is possible, as WENYON (1914) suggested, that the parasite of kala azar is an insect flagellate which normally passes directly from one insect to another, as do most of the purely insect forms, and that occasionally man is infected. If such were the case it would be unnecessary to suppose that the insect invariably infects itself from the vertebrate host, though it might do so. CORNWALL and MENON (1918) suggested the possibility of kala azar being conveyed by the rupture of an infected bug on the excoriated skin.

Relation of Insect Flagellates to Leishmaniasis.

In 1913 LAVERAN and FRANCHINI published an account of certain experiments they had conducted with *Leptomonas ctenocephali* of the dog flea, *Crithidia fasciculata* of *Anopheles maculipennis*, and *Crithidia melophagi* of the sheep ked. It was claimed that rats and mice could be infected with these flagellates by intraperitoneal inoculation. Furthermore, they stated that mice which were kept with infected fleas or had been fed on these insects became infected. Similar experiments were reported by FANTHAM and PORTER (1914–16) in the case of dogs, mice, birds, fish and amphibia. These investigations promised to throw a new light on the relationship of insect flagellates to vertebrates, and suggested that kala azar or oriental sore might be the result of infection of man with flagellates which had hitherto been regarded as peculiar to the invertebrates. LAVERAN and FRANCHINI, in a series of papers, extended their observations to other flagellates, including those of the house fly, sand fly (*Phlebotomus*), and even Euphorbia plants. These observers claim that the inoculated animals develop an infection which bears a striking resemblance to those due to leishmania, in that leishmania forms of the parasite occur in the blood, spleen and liver, or other organs. Flagellate leptomonas forms also were found in the blood. These infections are said to be transferable by subinoculation to other animals, which in some cases were killed by the presence of the organisms. Many of the statements made by these authors are difficult to understand. The apparent ease with which the infections were produced in their experiments stands in marked contrast to the uniform failure of other observers. Furthermore, the experiments with the flagellate of the sheep ked, which is almost certainly the invertebrate stage of the sheep trypanosome, is described as producing an infection of the kala azar type rather than one which would be expected to arise from the inoculation of a trypanosome. In this connection the recent investigations of HOARE (1921) are of significance. This observer attempted to repeat some of the experiments above described. Though these were conducted with abundant material and with the greatest care, no single instance of an infection of a vertebrate by an invertebrate flagellate was demonstrable. In the light of these results the uniform and rapid successes above described are very difficult to explain, and it is doubtful whether they throw any light on the problem of the transmission of kala azar. The experiments of previous observers have been collected in tabular form by HOARE (1921), and readers who are interested in the details are referred to his paper.

Culture of Leishmania.

It is now known that *L. donovani* can be easily cultivated in the water of condensation which forms in the tubes of Nicolle's rabbit-blood-agar medium first described by MANCEAUX (1911), and generally known as the Novy, McNeal, Nicolle (NNN) medium. It was also shown by NICOLLE and MANCEAUX (1911) that growth took place on the surface of the solid medium above the water of condensation. This medium has now been extensively used, and it has been abundantly proved that strains of leishmania can be maintained indefinitely by subcultures in it. NICOLLE (1921) has stated that a strain of *L. donovani* has been thus grown for over ten years at Tunis, and that during this period it has been subcultured over 291 times.

THOMSON J. G. and SINTON (1921) record the successful culture of *L. donovani* from the bone marrow of a case of kala azar 14 hours after death. The case, which has been referred to by MANSON-BAHR, had received a course of injections of tartar emetic. Successful cultures have, however, been previously obtained at post-mortems as late after death as 36 hours.

Prophylaxis.

As we have no definite knowledge of the etiology of kala azar it is evident that any prophylactic measures must, of necessity, be of an empirical nature. As BASILE and other Italian observers believe that the canine disease of the Mediterranean area is identical with that occurring in children and that the flea is the agent of transmission, the removal of dogs from close association with human beings and the destruction of possibly infected dogs have been advocated as a means of prevention. BASILE (1916) records that in Bordonero in Sicily, where both the human and canine diseases were common, most of the infected dogs were destroyed. In the following year there were no fresh cases in children, and in the year after only one, though in that in which the dogs were killed there had been seven new cases in a population of 2,000.

In India prophylactic measures have been based on the known fact that kala azar is a house and family disease. KNOWLES (1920) gives some very instructive instances, in which several members of one family were found suffering from the disease. The following groups are recorded :—Mother and nine brothers ; father, sister and three brothers ; wife, daughter, sister and one brother ; mother and two brothers ; two brothers and sister-in-law.

In 1914, DODDS PRICE and ROGERS published an account of the uniform success of segregation measures in eradicating kala azar from Assam Tea Gardens. On one estate new coolie lines were erected 300 yards distant from the old lines. Of 240 persons, 96 who had no cases of kala azar in their families were removed to the new lines. The new lines were filled up with new coolies to the extent of 800. This transference was carried out in 1897 and sixteen years later the new lines were still free from the disease, while the coolies in the old lines had died during the following few years. Kala azar, furthermore, spread from the old lines to a contiguous line, in which 60 healthy coolies were housed. One-third of these died during the next fifteen months and all the rest succumbed or left the estate during the few succeeding years. Other illustrative examples are quoted in the same paper in support of house infection as an important factor in the spread of the disease.

MCCOMBIE YOUNG (1920) describes the measures which are being adopted in Assam to cope with the spread of kala azar. Known endemic areas are annually inspected, and when a village shows a large number of cases the disease is considered as hyper-endemic and the population is removed to a new locality, the definitely infected, the contacts, and the uninfected individuals being segregated separately. In the case of areas which show infections for the first time more radical measures are adopted. The population of every village which shows even a single case is removed to a new site. It is too early to speak of the results of these radical measures.

MCCOMBIE YOUNG points out that the newly introduced treatment by tartar emetic promises to facilitate the eradication of the disease. It is becoming widely known, and its success appreciated by the native population.

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ON THREE SUPPOSED NEW ENTAMOEBAE OF MAN: A REVIEW.

By C. M. WENYON.
Sectional Editor, Tropical Diseases Bureau.

In the first of the papers the title of which appears below* CHATTERJEE describes a case of amoebic dysentery due to an amoeba for which he establishes the new species *Entamoeba paradysenteria.* The lesions, which were seen three hours after death, included ulceration of the large intestine of typical amoebic character, and also, what is unusual in such infections, an ulceration of the lower part of the small intestine. In addition, perforation of the large intestine had taken place, with the formation of a localized abscess. Another feature was that opposite the ulcers of the large and small intestine the peritoneal surface was raised into thickened red patches, in scrapings of which active amoebae were found. They were also observed in the abscess pus. When the amoebae were first seen they were thought to be *E. histolytica,* but it was noted that they varied very much in size and some were vacuolated. It was only in sections and stained films that the author was led to doubt his original identification. The amoeba is said to differ from *E. histolytica* in that even in the non-motile stage there is a very marked distinction between ectoplasm and endoplasm. In some cases bacteria were seen in the endoplasm as well as red blood corpuscles, while "chromidia blocks," which the author says are commonly found in *E. histolytica,* were not seen. Most of the amoebae varied in size from 16 to 20 microns. Some were as large as 40 microns, and others as small as 8 microns. The nucleus differed markedly from the typical one of *E. histolytica.* It is situated eccentrically and is usually oval in shape. There is no differentiation into central and peripheral chromatin, and while a nuclear membrane was not easily distinguished, it is stated that no karyosome was present, though immediately after the nucleus is described as being of the "limax" type, the most characteristic feature of which is the presence of a large central karyosome. The amoeba is depicted in a series of plates, but the figures of the nuclei do not correspond with the text description. Some of the nuclei figured have definite membranes on which granules of chromatin are shown, while the central parts are occupied by diffusely stained areas. Other nuclei are evidently swollen and degenerate.

The two main characters which are supposed to distinguish this amoeba are the marked development of the ectoplasm and the peculiar structure of the nucleus. The author is correct in stating that the typical *E. histolytica* does not possess these features, and in this respect is justified in the title of his paper, but it is perfectly clear from the

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*1. CHATTERJEE (Gopal Chandra). An Atypical Amoeba causing Dysenteric Lesions.—*Philippine Jl. Sci.* 1920. Oct. Vol. 17. No. 4. pp. 385–394. With 3 coloured plates.

2. TIBALDI (Ettore). Sopra una nuova specie di ameba parassita trovata nelle tonsille.—*Ann. d'Igiene.* 1920. Oct. Vol. 30. No. 10. pp. 613–621. With 1 coloured plate.

3. KOFOID (Charles Atwood) & SWEZY (Olive). On the Free, Encysted, and Budding Stages of *Councilmania lafleuri,* a Parasitic Amoeba of the Human Intestine.—*Univ. California Public. Zool.* 1921. June 23. Vol. 20. No. 7. pp. 169–193. With 5 plates and 3 text figs.

figures he has produced that he is dealing with degenerating amoebae. The excessive development of the ectoplasm is a common feature of *E. histolytica* under abnormal conditions, while the peculiarity of the nuclei is easily accounted for in this manner. The material was obtained post-mortem three hours after death, during which important changes could readily have taken place in the structure of the amoebae. The fact that they were still active does not exclude this possibility, for very active *E. histolytica* often show striking abnormalities, while the rate of degeneration of amoebae in the body after death varies considerably from case to case. That a degenerative process was in progress is borne out by the fact that certain of the amoebae were invaded by bacteria. The appearances described by the author are perfectly familiar to the writer of this review, who is convinced that the supposed *Entamoeba paradysenteria* is nothing more than an abnormal and degenerate *Entamoeba histolytica.*

2. The second of the above papers, by TIBALDI, describes as *Entamoeba macrohyalina* an amoeba which he found in two cases of tonsillitis. In three other cases of tonsillitis he found only the well-known *E. gingivalis,* which occurs commonly in the material from carious teeth. Both these amoebae are illustrated in a coloured plate. The figures of *E. gingivalis,* though recognizable as such, do not depict the amoeba accurately, especially as regards the nuclei. It is evident that the method of preparation of the films was not a reliable one.

The chief features which distinguish the amoeba, which the author calls *E. macrohyalina,* from *E. gingivalis* are the presence of a marked ectoplasm and the large size, the amoebae measuring from 24 to 40 microns in diameter, instead of 10 to 25 microns. In the figures given by the author the nuclei of the two amoebae differ considerably, but it is evident that the appearances do not give an accurate idea of their true structure. It may be gathered, however, that the amoebae differ from the ordinary forms of *E. gingivalis,* but that *E. gingivalis* can never assume such a form no evidence has been produced. The typical *E. histolytica,* when perfectly fresh, has only a narrow ectoplasm, but owing to degenerative changes the ectoplasm very quickly increases in thickness. It is possible that such a change may take place in *E. gingivalis,* in which case it would assume the characters of *E. macrohyalina.* It is also conceivable, though unlikely, that *E. histolytica* itself might invade the tonsil, and the figures of *E. macrohyalina* might pass for badly fixed specimens of this amoeba. Though the author has drawn attention to an amoeba which differs as regards size and development of ectoplasm from *E. gingivalis* as usually seen, he has produced no evidence that he was not dealing with an altered form of the common amoeba of the mouth. On this account it is entirely premature to create a new species.

3. In the third paper KOFOID and SWEZY describe as *Councilmania lafleuri* a new amoeba of the human intestine. They give a very detailed description, which is well illustrated by five plates in black and white. The new amoeba, according to these authors, has hitherto been confused with *E. coli,* primarily because it also produces an eight-nucleated cyst.

The life-history of the parasite may be thus outlined. As seen in the living condition, it is a very active organism when compared with *E. coli,* and has a well-developed ectoplasm. It forms pseudopodia of ectoplasm with the rapidity and suddenness of *E. histolytica,* and like this species it ingests red blood corpuscles. As binucleated forms occur, presumably multiplication by binary fission may take place. The method of reproduction, which is the chief characteristic of this amoeba, is by a remarkable process of bud formation from the cyst. The encysted forms, like *E. coli*, develop eight nuclei, but the cyst wall is thicker, so that staining is difficult. Within the cyst there occur chromatoid bodies, while the nuclei tend to collect at the centre. It is stated that the nuclei on division have six chromosomes instead of the eight that *E. coli* is said to possess. A large glycogenic vacuole is present in the early stages, and this is said to be relatively "resistant to iodine." In the later stages the chromatoid bodies appear to give rise to a band called the "chromophile ridge." This structure is supposed to take some part in the formation of the buds. When budding is to take place a pore is formed in the cyst, to which the chromophile ridge is applied. Through this pore, near which the eight nuclei collect, a bud or hernia of cytoplasm is protruded. Into it one of the nuclei passes, and it is then nipped off as a small amoeba. By repeated budding-processes all the nuclei are used up to form eight small amoebae. The whole of this process is stated to take place in the one host.

The amoeba thus described has some of the characters of *E. coli*. Without transference to a new host, however, it produces eight small amoebae by a budding-process through a pore in its wall. It is recognized by the authors that these amoebae and cysts have been seen by other observers, but they think that they have been erroneously included in the species *E. coli*.

It is generally known that *E. coli* produces an eight-nucleated cyst, which is transferred to a new host, where escape from the cyst takes place either as a single eight-nucleated body or as eight small amoebae. Exactly what happens is not known, though CASAGRANDI and BARBAGALLO from their experiments on cats, give a figure of the escape of the amoebae from the cyst which bears some resemblance to the figures of KOFOID and SWEZY, as indeed they recognize. They have produced, however, no evidence that the escape of the supposed new amoeba from the cyst is different from that of *E. coli* from its cyst. The only variation is that they claim that the process takes place in the host in which the cysts are produced instead of in the next host. They draw attention to a figure of the cyst of *E. muris* of the mouse published by the reviewer in 1907, who thought at the time that this might be a developmental process, but now realizes that he was dealing with a ruptured cyst. It seems abundantly evident, therefore, that there are no grounds for the creation of the new genus *Councilmania;* the amoeba, whatever may be its specific name, undoubtedly belongs to the genus *Entamoeba.*

As regards the specific characters of this amoeba, there are several points which require further elucidation. The fact that certain forms ingest red blood corpuscles is readily explained on the assumption that a double infection with *E. histolytica* occurred in some of the cases. The authors do not produce sufficient evidence to exclude such a possibility. The nucleus is certainly different from that of the typical *E. coli* or *E. histolytica*, but it is well known, though perhaps not sufficiently recognized, that both these amoebae frequently show nuclei which are far from typical. The reviewer has often seen the appearances here depicted in undoubted *E. coli* or *E. histolytica.* The assertion that the new amoeba has eight chromosomes during nuclear division, whereas *E. coli* has only six, comes as a surprise to the reviewer, who was under the impression that no definite chromosomes are formed during the division of the nucleus of *E. coli.* Such stages of the division of the nucleus of *E. coli* as he has seen give no indication of chromosome formation, and this is borne out by DOBELL'S detailed description of the division of the nucleus of *E. histolytica*, which is of a similar type.

When the peculiar method of budding is considered the most striking fact is that the process is an entirely new one. The reviewer is not aware that it has been described for any other protozoon. This does not, of course, exclude the possibility of its occurrence, but makes one hesitate to accept it unless every other possible explanation has been excluded. In the very numerous observations the reviewer has made on cysts of *E. coli* he has noted on many occasions that in saline preparations it is quite easy to rupture the cysts of *E. coli* between the slide and cover-glass. In such cases the cytoplasm protrudes as a hernia, and this may contain a single nucleus, while the other nuclei are congregated about the opening in exactly the manner described by KOFOID and SWEZY for their new amoeba and depicted in their figs. 22 and 27. The chromophile ridge on which they lay so much stress appears to be in some cases nothing more than a fold or crease of the inner membrane of the cyst, which is readily seen in ruptured cysts of *E. coli*. In others it possibly represents chromatoid bodies. The ridge is described as being associated with the pore, and from the explanation just given this is exactly what would be expected. The crease in the membrane would commence where the rupture of the cyst had taken place. The pore through which the buds are supposed to be formed is depicted as being already present in the four-nucleated stage (fig. 25). The authors have considered the possibility of the appearance being produced by a rupture of the cyst, but they put this aside with the statement that "it is not due to trauma and cannot be produced by pressure." From the observations on cysts of *E. coli* mentioned above the reviewer is in a position to state that appearances of the same kind can certainly be produced by artificial rupture of the cyst of *E. coli*. KOFOID and SWEZY claim that the process of bud formation has been watched in living specimens, but it is significant that they state that they have not yet been able to watch the detachment of the amoebulae, though in one instance cytolysis of the bud was observed to take place.

In spite of the fact that eleven cases of infection with this amoeba are said to have been seen, the reviewer is unable to resist the conviction that the amoeba is none other than *Entamoeba coli*, and that the supposed budding process is an accident resulting from a rupture of the cyst and a gradual expulsion of cytoplasm through the opening. It seems highly probable that MATHIS and MERCIER (1917), in their description of the escape of amoebulae from the cysts of *E. coli*, were observing similarly damaged cysts [this *Bulletin*, vol. 10, p. 130]. It would be quite impossible in ordinary work to distinguish either the vegetative stages or the cysts of the supposed *Councilmania lafleuri* from those of *E. coli*, and it can serve no practical nor scientific purpose to regard the forms described as belonging to a distinct species. This being so, there is no alternative but to add the name *Councilmania lafleuri* to the long list of synonyms which *Entamoeba coli* already possesses.

There is one other striking assertion in this paper which requires very careful consideration. It is said that a case of human infection with *Entamoeba muris* of the rat has been seen. The reviewer, who has frequently studied this parasite during the past fifteen years, knows of no method of distinguishing the amoeba of the rat from *E. coli* of man. On the other hand it might very legitimately be argued that the two are identical, so that the reviewer is at a loss to understand how the diagnosis of *E. muris* was made for an amoeba of the human intestine.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

THOMSON (John Gordon) & ROBERTSON (Andrew). **The Value of Laboratory Reports on Stools in Cases of Suspected Amoebic Dysentery, and their Interpretation by the Clinician; with a Special Note on the Diagnostic Significance of Charcot-Leyden Crystals.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1921. Vol. 14. pp. 33–44. With 4 figs.

From March to September 1920, 999 stools from 207 patients in the Hospital for Tropical Diseases, London, were examined by the authors of this paper, of which 32 cases were definitely diagnosed as amoebic dysentery. The number of amoebic cases with Charcot-Leyden crystals in their stools was 8, or 25 per cent. These are most common in the stools of long-standing infection with *Entamoeba histolytica*; their number varies immensely, and does not appear to have any relation to the severity of the disease; the greatest number are found in proximity to an amoebic ulcer, and may best be demonstrated by means of the sigmoidoscope. On two occasions the crystals were observed within the endoplasm of an active *Entamoeba histolytica.* They may result from the cytolysis of eosinophil leucocytes, or they may be an excretion of the entamoeba itself.

They are never found in dysentery of bacillary origin, and the authors agree with ACTON that they are not found in entozoal infections of man in which the presence of *E. histolytica* has been excluded.

Two cases are cited in which numerous systematic examinations of the faeces failed to reveal the entamoeba, but on the ninth occasion active organisms were found; the stool itself contained these crystals in numbers all the time. The authors conclude that Charcot-Leyden crystals in human stools are diagnostic of amoebic colitis.

P. H. Manson-Bahr.

THOMSON (John Gordon) & ROBERTSON (Andrew). **Charcot-Leyden Crystals in the Stools as an Aid to the Diagnosis of Entamoebic Dysentery.**—*Jl. Trop. Med. & Hyg.* 1921. Nov. 15. Vol. 24. No. 22. pp. 289–292. With 2 plates.

In the experience of the authors of this paper the Charcot-Leyden crystals are frequently associated with entamoebic dysentery, and the proportion of cases showing them in the stools is greater than the 20·4 per cent. quoted by ACTON.

In one case they were present in an infection with *Isospora hominis,* but a further search revealed an entamoeba of undetermined species as well. The largest number of crystals were seen in scrapings of amoebic ulcers obtained through the sigmoidoscope; in these specimens the crystals are arranged in clumps. In formed stools the crystals may constitute the only sign of amoebiasis. There is considerable variation in their size; they may reach 70μ in length; the average is between 5μ and 25μ. In shape they are typically like a whetstone. Soluble in warm water, acetic acid, strong mineral acids and alkalis, they are insoluble in cold water, alcohol, ether, glycerine, xylol and chloroform.

The exact chemical composition of these crystals is unknown; it is suggested that they may be the product of some secretion of the entamoeba, either by itself or in combination with some mucilaginous substance. The diagnosis of amoebic dysentery is difficult; it is, therefore the authors' contention that, while persistent efforts should be made by protozoologists to find the entamoeba, Charcot-Leyden crystals, which are found in from 20 to 25 per cent. of cases of amoebiasis and have not been found in any other condition (from which possible amoebiasis has been excluded), may supply evidence sufficient to ensure treatment on the right lines by the clinician.

P. H. M-B.

RAVAUT (Paul) & CHARPIN. **L'amibiase en France pendant la guerre.**—*Jl. Méd. franç.* 1919. Apr. [Summarized in *Bull. Inst. Pasteur.* 1921. May 15. Vol. 19. No. 9. pp. 318–319.]

The authors have investigated the question of amoebiasis in France; the statistics collected at Marseilles showed :—

19·5 per cent. of sick evacuated from the Orient were infected.
25 per cent. of colonial troops.
15 per cent. of medical cases from the French front.
27·3 per cent. of medical cases from the interior.

The last figure is a remarkably high one, but the authors remark that the environs of Marseilles and Toulon are the regions most liable to importation of amoebic cases from abroad.

The majority of the clinical amoebic cases in France are of a mild nature.

P. H. M-B.

SCOTT (Henry Harold). **A Study of the Sizes of** *Entamoeba histolytica* **Cysts amongst Symptomless Carriers in Jamaica.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 133–148. With 25 text figs.

This paper gives in much detail the results of large series of measurements of *E. histolytica* cysts from ten hospital cases admitted for

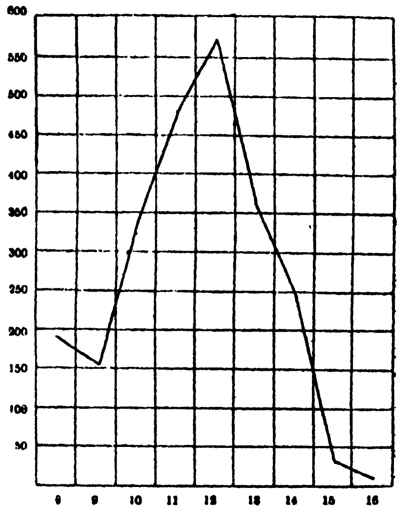

FIG. 25. Showing size of *E. histolytica* cysts (2,389). The curve is drawn up giving the numbers of cysts found within certain intervals of a complete 1μ. It is bimodal, the modes occurring between 7μ and 8μ and between 11μ and 12μ. (Reproduced by permission from the *Annals of Tropical Medicine and Parasitology.*)

complaints not connected with the bowels. The results in each individual case are graphically represented, and a curve showing the range of size in the aggregate of 2,389 cysts is also given. This final curve is bimodal between 7μ and 8μ and between 11μ and 12μ. The details of certain cases, where the number of cysts was large and frequent examinations were made, do *not* support the proposition that "the mean diameter of cysts from any patient is not subject to any considerable variation from day to day, but remains constant." On the contrary, among the cases here carefully recorded are some showing, in the course of consecutive examinations extending over a term of some duration, a gradual change from small to ordinary cysts and vice versa. It is not possible to summarize further a paper so largely statistical.

A. Alcock.

SCOTT (Henry Harold). **A Study of the Sizes of** *Entamoeba coli* **Cysts amongst Symptomless Carriers in Jamaica.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 149–160. With 23 text figs.

Results of a series of measurements of *Entamoeba coli* cysts from six hospital cases admitted for complaints not connected with the bowel. The individual cases are considered and graphically presented separately. The graph of the aggregate of 2,500 cysts is bimodal, both modes being at a high level, namely, 17μ to 18μ and 19μ to 20μ.

A. A.

CAUCHEMEZ (L.). **Fréquence des amibes iodophiles chez le porc, en France.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 321–322. With 1 text fig.

In a verbal communication here published BRUMPT expresses the opinion that the iodophil amoeba discovered by WENYON, and identified by BRUG with PROWAZEK's *Entamoeba williamsi* and by DOBELL with *E. bütschlii* of PROWAZEK, is not amenable to the jurisdiction averred, but should be known as *Iodamoeba wenyoni*, Brumpt.

With regard to O'CONNOR's discovery of this species in pigs at Funafuti, the author now records its frequent occurrence in pigs in France, so much so that he inclines to think that, like *Balantidium coli*, it may be looked upon as a habitual parasite of the pig.

A. A.

FISCHER (Walther). **Ueber Darmamöben und Amöbenruhr in Deutschland.**—[Intestinal Amoebae and Amoebic Dysentery in Germany.] *Berlin Klin. Woch.* 1920. Jan. 5. Vol. 57. No. 1. pp. 7–10.

Systematic faeces examinations carried out on 120 patients during the war have proved that autochthonous cases of amoebiasis occur in Germany. In doubtful cases concentration methods and staining of faecal films were resorted to. Infection with *Entamoeba histolytica* was found twice and with *Entamoeba coli* eleven times.

The first case was that of a girl of 18 who had suffered for eighteen months past from diarrhoea; typical "vegetative" entamoebae with ingested red blood corpuscles were found. The second was that of a young soldier who had contracted dysentery on Lake Narotsch. Diarrhoea and tenesmus persisted; both cysts and active amoebae were found.

P. H. M-B.

VAN DER HOEVEN (J.). **Een geval van lever-absces na inheemsche amoeben-besmetting.** [An Indigenous Case of Amoebic Abscess of the Liver (Holland).]—*Nederl. Tijdschr. v. Geneesk.* 1921. May. Vol. 65. 1st half-year. No. 22. pp. 2940–2942.

This is an interesting description of an indigenous case of amoebic abscess of the liver in a native of Holland.

The patient was a married woman, aged 39, who had never been out of Holland. She was admitted to the hospital at Zutphen (Gelderland) at the beginning of October, 1920, having then been ill for some two months. On admission she had a temperature of 39° C., a weak and rapid pulse (110 per min.), an enlarged and painful liver, scanty urine, and oedema of the abdominal wall, lumbar region, feet, and legs. Some two months previously the patient had been treated for pyelitis, and at that time had abdominal pains, an enlarged liver, and loose stools.

Abscess of the liver was diagnosed, and two days after admission an operation was performed. A large abscess (site not stated) was found, and a quantity of thinnish, turbid, and reddish pus—estimated at "one or two litres"—was evacuated. The cavity of the abscess was washed out subsequently with a 0·2 per cent. solution of emetine hydrochloride, and hypodermic injections of the same drug (30 mgm. daily for 11 days) were administered. The patient made an uneventful recovery, and was discharged as cured at the end of November.

Microscopic examination of the pus from the abscess revealed blood corpuscles, cellular débris, and amoebae. These were motile, with hyaline and distinctly differentiated ectoplasm and an eccentric nucleus, and sometimes contained ingested red corpuscles. Their finer cytological details are not described, and their size was not, apparently, determined accurately ("under a magnification of 200 diameters they looked about as big as ten-cent pieces"*). These amoebae were identified as *Entamoeba histolytica* (or *E. dysenteriae*), and it is stated that "*minuta*" forms of the same species were found in the abscess pus and also in the patient's urine.

[It is unfortunate that no microscopic examinations of the patient's stools appear to have been made, and the discovery of "amoebae" in the urine—far from supporting the diagnosis—tends to throw doubt upon what is otherwise an apparently authentic indigenous case of amoebic abscess of the liver. The "*minuta* amoebae" observed in the urine are described as "peculiar, round, refractile, large cells," and it is stated that they were first found and interpreted as amoebae by Dr. BLOK of Zutphen. The reviewer has had an opportunity, through the courtesy of this gentleman, of studying some of these structures, and is convinced that such an interpretation was not warranted. Apart from these highly questionable urinary "amoebae," however, he sees no reason to question the correctness of the diagnosis in the present case. It is now known that *E. histolytica* occurs indigenously in Holland—see this *Bulletin*, Vol. 17, p. 3—and consequently the sporadic occurrence of cases of amoebic liver-abscess is to be expected.]

Clifford Dobell.

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* A silver coin a little smaller than a threepenny-bit.

JONES (D. W. Carmalt). **A Case of Amoebic Dysentery contracted in New Zealand.**—*New Zealand Med. Jl.* 1921. Oct. Vol. 20. No. 99. pp. 259–260.

A healthy man aged 36 went into a military camp in 1916 for training. The weather was very hot, and after a week he reported sick with diarrhoea and vomiting. Since that date diarrhoeic attacks have occurred every month. On microscopic examination the stools contained much blood-stained mucus and numerous active entamoebae. The evidence for the claim made in the title appears to be fairly conclusive.

P. H. M-B.

PARANHOS (Ulysses) & REIS (Paiva). **Formas atypicas da amibiase intestinal.**—*Brazil Medico.* 1921. Aug. 6. Year 35. Vol. 2. No. 4. pp. 37–39.

In view of the fairly frequent occurrence of clinically atypical amoebiasis the author urges the importance of a routine examination of faeces in cases presenting intestinal symptoms. Clinical histories are given of five such cases where symptomatic treatment having failed completely, an examination of faeces revealed amoebae or their cysts or both. Emetine treatment effected a complete cure in three of the cases; in another the patient's condition was so much improved that he ceased to visit the physician; while in the fifth the result is unknown, as the patient resumed an interrupted journey immediately after the commencement of treatment.

F. S. Arnold.

BROWN (R.). **Amebic Abscess of Liver with Pulmonary Sequels.**—*California State Jl. of Med.* San Francisco. 1921. July. Vol. 19. No. 7. p. 282. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Aug. 13. Vol. 77. No. 7. p. 574.]

The patient suffered from prolonged subacute dysentery during which he coughed up pus. Physical examination of the chest aided by X-rays revealed an abscess of the right lung continuous with an abscess of the liver. The necropsy confirmed the provisional diagnosis and showed that the lung tissue in the lower three-fourths of the right lower lobe had been destroyed, a large pulmonary cavity lying immediately beneath the pleura; in the left lower lobe a similar cavity was found. No opening in the diaphragm connecting the liver and lung abscesses was apparent; it is possible that the diffusion of the amoebae from the liver to the lung took place through the circulation. The existence of an abscess cavity in the left lung was not noticed on X-ray examination, but a subsequent and more minute examination of the plates showed that a faint shadow was present there.

P. H. M-B.

CHATTON (Edouard). **L'amibiase intestinale expérimentale du cobaye à *Entamoeba dysenteriae*. Ses caractères spéciaux; localisation caecale; absence de dysenterie; importantes réactions hyperplasiques.**—*Arch. Inst. Pasteur de Tunis.* 1918. Mar. Vol. 10. No. 3. pp. 138–157. With 2 plates and 3 text figs.

Few animals are susceptible to infection by human entamoebae. Amoebic lesions have been observed under natural conditions in the badger, sewer-rats (LYNCH) and various monkeys. Under experimental conditions the disease has been reproduced in the cat and dog; the rat is particularly refractory. Previous workers had been unsuccessful in reproducing the disease in guinea-pigs, but Chatton was fortunate in producing infection in one case by feeding the animal on cyst-containing human faeces.

Emaciation was the only marked symptom the animal exhibited during life, though at autopsy the caecum especially showed infiltrations of the submucosa, alternating with transparent patches. The small intestine, save for a slight hyperaemia of the mucosa, appeared quite normal. The entamoebae obtained from scrapings of the lesions when stained by the iron-haematoxylin method showed in every detail the typical structure of *Entamoeba histolytica.*

Several further attempts at experimental infection of other guinea-pigs were made, and were successful in one other instance; this animal was injected per rectum with a saline emulsion of scrapings of the caecal mucosa of guinea-pig no. 1. The incubation period of the disease was in the first instance 20 days, in the second 9 days. Chatton considers that further successful infections in this animal will be obtained by cyst-feeding *per os.* The possible source of error in making further experiments on these lines lies in the fact that the guinea-pig is parasitized by an entamoeba (*Entamoeba caviae* of WALKER) which is of the *coli* type, but the author is quite certain, and in this he is supported by NICOLLE, that no amoebic lesions resembling those described above have ever been seen in normal guinea-pigs at autopsy.

Histological studies revealed considerable differences from those commonly observed in human or cat amoebiasis. To the necrotic and inflammatory changes in the submucosa, so commonly observed, are superadded a curious hyperplasia, especially of the fundi of Lieberkühn's follicles, together with a very considerable exfoliation of the columnar epithelium. The invasion of the submucosa by the entamoebae takes place through the dilated fundi of Lieberkühn's follicles, for here they are to be found in greatest numbers. The ramifications of these glands, almost oedematous in appearance, extend through the muscularis into the submucosa. In fact the changes in the submucosa are strongly reminiscent of a neoplasm; new blood-vessels are formed surrounded by neoplastic cells. This histo-pathological picture Chatton would describe as a sarcomatous hyperplasia.

A study of these early lesions certainly supports the theory that the entamoebae, attracted by the mucus-secreting cells, enter the crypts and attack the culs-de-sac of the glands where the mucus-laden cells predominate, and it is at this point they break through the muscularis and enter the submucosa; the hyperplasic reaction would appear to result as a response to some secretion emanating from the entamoebae. The main result of this study, the author considers, is the support it affords to the parasitic theory of neoplasms.

P. H. M-B.

FINOCHIETTO (Enrique) & VACCAREZZA (Raúl F.). **Tumor inflamatorio del intestino grueso de origen amibiano.** [Inflammatory Tumour of the Large Intestine, Amoebic in Origin.]—Reprinted from *La Prensa Medica Argentina.* 1920. Oct. 20. 23 pp. With 6 text figs.

Amoebiasis is not the least important of possible causes of an inflammatory tumour of the large intestine. One may suppose that inflammatory tumours described by other South American writers were amoebic in origin, especially those cases in which there has been more or less chronic colo-rectitis or in which ulcerative colitis was found at autopsy. The following case came within the writers' experience.

At the age of 25 the patient was in bed for a week with fever and bilious vomiting. A month later the fever returned and was accompanied by intense and continuous pain in the left hypochondrium, with swelling in the same region. This illness was followed by attacks of diarrhoea in which the patient had four or five mucous blood-stained stools and sometimes a frank haemorrhage. After seven or eight months of this he came for treatment, complaining of a tumour in the right side. On examination this was found to occupy the whole of the right iliac fossa, extending upwards to the costal margin and across to the middle line. Blood examination showed: red cells, 4,500,000; leucocytes, 10,300. An examination of faeces for amoebae was negative. Bismuth meal and enema showed an irregular constriction of the caecum and ascending colon. Laparotomy revealed a tumour adherent to the lower border of the liver and the stomach. It included the ascending colon and caecum. The whole of this portion of the gut was removed, ileo-transversostomy performed, and the abdomen closed. The patient recovered from this operation without incident. However, the patient complained two years later that his symptoms remained as before the operation. By a rectoscopic examination the rectal mucosa was seen to be hyperaemic and covered with numerous and typical dysenteric ulcerations. *Entamoeba histolytica* and *Chilomastix* (*Tetramitus*) *mesnili* were found in the stools. After three injections of emetine the patient refused further treatment. He returned later and was treated daily with three keratinized capsules of double iodide of bismuth and emetine (Allen & Hanbury) and 1 per cent. iodine enemas. This treatment, continued over a period of more than one year, resulted in an apparent cure.

The tumour, with the ascending colon, the caecum, and a part of the transverse colon, were examined three years after fixation in formol. At that time the tumor was 12 cm. high by 10 broad. On section it had a lardaceous appearance. The three layers of the colon were recognizable in places, apparently not much thickened. The subserous cellular tissue was, however, much infiltrated, and formed a thick envelope to the colon. There was some haemorrhage into the mucosa, but no visible ulceration. Microscopically the tumour had the appearance of granulation tissue. Section of the wall of the colon showed superficial ulceration of the mucosa, leucocytic infiltration of the submucosa and muscular walls. The vessels showed various stages of obliterative endarteritis. There was no histological or clinical evidence to suggest that this tumour was due to tuberculosis, syphilis, or to a mycosis.

Is the amoeba alone the cause of this inflammatory tumour, or is it due to the existence of a secondary infection imposed on the dysenteric ulceration? The writers are not prepared categorically to inculpate the entamoeba, but they consider as suggestive the experiments of CHATTON (see above), who has shown that dysentery in the guinea-pig is confined to the caecum and is associated with hyperplasia of the mucosa.

J. Rosslyn Earp.

JEPPS (Margaret W.). **Notes on Treatment with Emetine at the University War Hospital, Southampton.**—*Jl. Roy. Army Med. Corps.* 1921. June. Vol. 36. No. 6. pp. 443–451.

Salol-coated pills of emetine bismuthous iodide proved unsatisfactory, for 45·1 per cent. at least out of a series of 26 cases relapsed after a 12-day course of 36 gr. An emulsion of EBI in liquid paraffin gave much better results, for only 12·7 per cent. out of a series of 63 cases relapsed after a similar course. No less than 11·1 per cent. were still uncured after re-treatment with a double course. Injections of emetine hydrochloride were found useful in cases which could not tolerate EBI; three out of five cases were cured by a course of 12 daily injections of 1 gr. each. This treatment benefited the general condition of the patient, and there were no permanent ill effects. It appears that objections to liquid paraffin as an excipient for EBI are ill-founded. The emulsion contains 3 gr. of EBI to the half-ounce of liquid paraffin. A dose (½-oz.) is easily taken if dropped into a glass containing two to three ounces of water; the emulsion floats and is readily swallowed. The proportion of relapses in EBI cases treated in this manner is very much less than with salol-coated pills. In the whole series of EBI-treated cases (75), the course had only to be stopped on account of untoward symptoms in 10 instances.

P. H. M-B.

VACCAREZZA (Raúl F.). **Algunas consideraciones sobre el tratamiento de la amibosis intestinal y la posología del clorhidrato de emetina.**—Reprinted from *La Semana Médica.* 1921. No. 5. 16 pp.

Common mistakes in the administration of emetine hydrochloride for amoebiasis are (1) to use too small doses, such as were prescribed by ROGERS in his first therapeutic experiments with this drug, and (2) to abandon treatment prematurely when the symptoms disappear, forgetting the chronic nature of amoebic infections. Treatment should be commenced early, carried on intensively, and repeated systematically.

An adult with acute infection should receive daily 0·08 to 0·10 gm. of emetine hydrochloride hypodermically, for a period of six to eight consecutive days. A second series of injections is given after a minimum interval of ten days, and thereafter the series are repeated, the interval being prolonged between each. The total length of treatment will depend on the history and clinical evolution of the case, the results of faecal examinations and the degree of intoxication. If intestinal disorders persist, or if cysts continue to appear in the faeces, recourse should be had to the double iodide of bismuth and emetine, or to some other medication indicated in chronic infections.

If there is some chance of disappointment when the treatment is not energetic enough, there is also danger in a too energetic use of emetine. The experiments of GUGLIEMETTI and HOUSSAY on the dog have shown that death may result (*a*) within 24 hours of the injection of very large doses (0·005–0·0075 gm. per kg. weight of dog); (*b*) within 7 to 12 days of injection; and (*c*) as a result of cumulative intoxication after a considerable interval. In man no sudden death from emetine poisoning has been reported, but several cases of delayed poisoning are on record. The writer considers that the following are the maximum doses that can be given with safety: 0·15 gm. daily for not more than four days; 0·10 gm. for not more than seven days; 0·05 gm. for not more than 12 days, with long intervals between the series.

J. Rosslyn Earp.

MANINI (Leonida). **Contributo alla terapia medica dell'ascesso epatico dissenterico.** [The Medical Treatment of Dysenteric Abscess of the Liver.]—*Policlinico.* Sez. Prat. 1920. Mar. 15. Vol. 27. No. 11. pp. 323-327.

The article deals with a case of abscess of the liver in a patient with chronic dysentery. No amoebae were found either by puncture of the abscess or by examination of the faeces; but as the fluid taken out by test puncture did not show any leucocytes, but detritus and fragments of cells, the diagnosis was amoebic dysentery; moreover, the serological tests for bacillary dysentery gave negative results. The patient was treated only by emetine [see this *Bulletin*, Vol. 15, p. 192], *i.e.*, without surgical intervention, not even the evacuation of pus by puncture; 9-12 cgm. of the hydrochloride by hypodermic injection daily for four days; like series of injections followed at various increasing intervals, the second series after four days, the third after a week, the last after more than a week. The two latter series of injections were given as a precaution, because the patient had almost recovered after the second series. A month after the end of the treatment the condition was still quite good.

The author does not discuss the question whether recovery takes place by absorption of the contents of the abscess or by the formation of a fibrous capsule around its necrotic material.

E. J. Pampana.

[The evidence that an abscess, in the usual acceptation of the term, existed seems hardly sufficient.—P. H. M-B.]

RÉNON (L.) & BLAMOUTIER (P.). **Un nouveau cas d'abcès amibien du foie cliniquement guéri par l'émétine sans ponction ni intervention. (Présentation de malade.)**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Feb. 17. Vol. 37. No. 5. pp. 152-154.

The noteworthy points of this case were: The abscess was situated in the left lobe and was of sufficient size to cause an appreciable tumour underneath the xiphoid process. All symptoms disappeared with emetine injections and intravenous neosalvarsan. In 20 days the red cells had increased by 1,200,000, and the leucocytes had decreased from 19,200 to 8,200. The first symptoms of hepatic suppuration occurred 27 years after the first attack of dysentery.

P. H. M-B.

MÜHLENS (P.) & MENK (W.). **Ueber Behandlungsversuche der chronischen Amoebenruhr mit Yatren.** [Experimental Treatment of Chronic Amoebic Dysenteries with Yatren.]—*Muench. Med. Woch.* 1921. June 30. Vol. 68. No. 26. pp. 802-803.

The sum total of ten years' experience in the Tropical Institution in Hamburg indicates that at present we have no infallible cure for amoebiasis. Emetine injections have at the best but a fleeting and transitory effect; the authors have observed no appreciable alteration in amoebic ulceration of the bowel, both during and after the exhibition of this drug.

Since the war efforts have been made to discover a treatment for effecting the local extirpation of the entamoebae. Substances employed with the object of penetrating the deeper layers of the bowel, such as silver nitrate, iodine and chinosol solutions, all proved vain.

Appendicostomy and even caecostomy and subsequent lavage of the large bowel certainly ameliorated the condition, but did not accelerate the healing of the ulcerations. Since January 1921 experiments were undertaken with Yatren (5 parts iodine, 8 of oxychinolin, 7 of sulphate of soda). This preparation possesses high bactericidal properties without destroying the tissues, and at the same time acts as a cell stimulant. The first attempts were made with two specially resistant cases which after months of emetine treatment had undergone appendicostomy and caecostomy without success. In both instances an almost immediate clinical improvement took place. In six other resistant cases subsequently treated a similar remarkable improvement took place.

If on sigmoidoscopic examination ulceration is present, 200 cc. of a 2½–5 per cent. solution of Yatren should be introduced through a stout rectal tube in the usual manner. That absorption of the solution is taking place can be satisfactorily proved by means of the iron perchloride test of the urine. By the mouth Yatren can be given in powder form in capsules or pills in 1 gm. doses three times a day. Keratin coated pills are well borne. Intramuscular injection of 10 cc. of a 5 per cent. solution produced no undue reaction.

The following scheme of treatment is submitted; 8–14 days with enemata or doses by the mouth, with sigmoidoscopic and microscopic controls. After a week's interval repeat the treatment for 3–7 days; after still another similar interval a further course for 3–5 days. During active treatment absolute rest and strict dieting are necessary.

P. H. M-B.

VAN DER TOGT (A. C.) **Rietsuikerlavementen bij amoebendysenterie.** [Cane Sugar Enemas in Amoebic Dysentery.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 395–402.

The occasional failure of emetine as well as of emetine bismuthous iodide and other drugs either applied by the mouth or by enema in the treatment of amoebic dysentery incited the author to search for another method of killing the amoebae within the colon. He tried to increase the osmotic tension in the bowel contents to a degree harmful to the amoebae. Sodium chloride, soda, etc., are *a priori* too irritating in high concentrations, but ordinary cane sugar in a 20–40 per cent. solution was found to be very useful. Enemas of this solution were given twice daily during eight consecutive days. In some cases the cure had to be repeated, but out of a great number of cases (number not stated) in one only the amoebae failed to disappear definitely. Excretion of blood and mucus subsides very soon and patients recover quickly under this treatment. A striking example is quoted of the results of this cure, which, according to the author is as cheap as it is harmless and effective.

W. J. Bais.

SMYRNIOTIS. **Les lavements intestinaux à base de Tannin en remplacement de l'émétine, dans la dysenterie amibienne aiguë.**—*Presse Méd. d'Egypte.* 1921. Feb. 1. N.S. No. 34. p. 435.

The injection per rectum of solution of tannin, according to the author of this paper, causes a rapid healing of amoebic ulcerations and destruction of the amoebae. The formula recommended is as follows :—

Tannin	5 gm.
Tinct. opii	20 drops.
Arrowroot	15 gm.
Water	1 litre.

One enema should be given daily and the quantity graduated according to the condition of the patient. The fluid should be retained for a quarter of an hour.

P. H. M-B.

JOHN (J C.). **Notes on a Case of Liver Abscess treated by Aspiration and Injection of Quinine Hydrochloride. Recovery.**—*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 379–380.

The patient, being unable to stand a general anaesthetic, was aspirated under local anaesthesia. Ninety ounces of pus were withdrawn and eight ounces of quinine hydrochloride solution (gr. v to ʒ j) were injected into the cavity. Subsequent treatment consisted of emetine injections, gr. j daily for one week. Sixteen days after the first a second aspiration became necessary and 64 ounces of pus were similarly withdrawn, followed by a second course of emetine. A month later the man left the hospital feeling very well.

P. H. M-B.

FIGNOLINI (Felipe). **Sobre um caso de abscesso hepatico.**—*Brazil Medico.* 1921. June 11. Year 35. Vol. 1. No. 24. pp. 303–306.

A disquisition on the differential diagnosis of a case of liver abscess. Hepatic syphilis, hydatid cyst, carcinoma, bilharziasis and bacterial abscess are considered and dismissed in turn and a diagnosis of amoebic abscess arrived at in view of the rapid disappearance of the abscess under emetine injections and a history of previous dysenteric attacks.

F. S. Arnold.

PRENTISS (Elliott C.). **Observations on Amoebic Colitis.**—*Southwestern Med.* 1921. July. Vol. 5. No. 7. pp. 10–16.

This paper contains no novel or original observations.

P. H. M-B.

BACILLARY DYSENTERY.

ANDERSON (John). **A Study of Dysentery in the Field. With Special Reference to the Cytology of Bacillary Dysentery and its Bearing on Early and Accurate Diagnosis.**—*Lancet.* 1921. Nov. 12. pp. 998–1002. With 2 charts in text.

The writer was attached to a casualty clearing station on Suvla Bay from August, 1915, to the evacuation, and subsequently accompanied his unit to Egypt and served there and in Palestine and Syria until 1919.

In this paper he relates his experiences of dysentery, backed up by tables of statistics and graphs. In 1916 the weekly rate of dysentery per 100,000 strength was on the average about 80, but reached its maximum of over 200 in September of that year, after the battle of Romani. In the first quarter of 1917 dysentery was in abeyance; during the second quarter a field laboratory was established in connection with the active troops, and the examination of 479 diarrhoeic cases gave 8 as amoebic dysentery and 55 as bacillary dysentery (bacilli proven). Taking only the true dysenteries in this series the relative proportion would be:—Amoebic dysentery 12·7 per cent., bacillary dysentery 87·3 per cent. The autumnal rise of dysentery in 1917 commenced at the end of August and reached its maximum in mid-October. Of the total number of 501 abnormal stools examined in the laboratory, 385 proved to be bacillary and 5 amoebic; the percentage of the two forms works out, as bacillary dysentery 95·9 per cent., amoebic dysentery 4·1 per cent. Minute investigation upon the cytology of the freshly passed evacuations using stained films and making accurate differential counts of 500 cells revealed the following features:—

Bacillary Dysentery [proved by isolation of the Bacillus].

" 1. The preponderance of polymorph leucocytes, which constitute on an average 90 per cent. of the total cellular exudate.

" 2. Eosinophile cells were seldom or never present.

" 3. Macrophages were present in limited numbers, averaging about 2 per cent., but their size renders them very conspicuous.

" 4. 'Pyknotic' bodies were not found in any of the 15 cases under review." [*Cf.* Paper by WILLMORE & SHEARMAN, this *Bulletin*, Vol. 12, p. 311.]

Amoebic Dysentery.

" 1. The small proportion of polymorph leucocytes, the average content being only 7½ per cent.

" 2. The presence of eosinophiles is a conspicuous feature, the number varying from 2 per cent. to nearly 5 per cent.

" 3. Macrophages were not found in any of the five cases of this series.

" 4. 'Pyknotic' cell remnants were present in all cases, their average number reaching the very high proportion of 83 per cent."

If a laboratory is situated at the base and, as not infrequently happens, cases do not reach the base hospital until the tenth or twelfth day of illness, the bacteriological records must differ widely from those of a laboratory behind the front line, where specimens can be examined possibly on the day when the man "reports sick." The proportion of positive bacteriological findings depends upon the freshness of the faecal specimens; it is rarely possible to recover dysentery bacilli from an 8-hour-old evacuation. This was illustrated in 1918 when the laboratory was situated some considerable distance from the scene of active operations; there, out of 900 specimens examined by culture during the year, only 75, or 8·3 per cent., gave definitely positive results. These figures should be compared with the findings of the laboratory during the autumn of 1917, when out of 194 specimens 116, or 60 per cent., were positive.

P. H. M-B.

CRICHLOW (Nathaniel). **Acute Bacillary Dysentery.**—*Jl. Trop. Med. & Hyg.* 1921. Aug. 1. Vol. 24. No. 15. pp. 204–206.

The type of dysentery prevalent in the British Solomon Islands is the bacillary; this has not yet been proved bacteriologically, but from the fact that liver abscess is unknown, and that emetine has no effect, it is assumed that amoebic dysentry is very uncommon.

The last dangerous and widespread epidemic was in 1915 when, amongst plantation labourers, 71 out of a total of 119 deaths had to be ascribed to this disease. The mortality at the Government Hospital, Tulagi, for the past four years was as follows :—

	Number of cases treated.	Deaths.	Per cent.
1917	54	10	18·5
1918	52	8	15·4
1919	69	8	11·6
1920	88	8	9·1

Many of the cases are admitted to hospital in a hopeless condition.

P. H. M-B.

Boyd (Mark F.). **A Note on Bacillary Dysentery in Texas.**—*Texas State Jl. Med.* 1921. Sept. Vol. 17. No. 5. pp. 261–262.

This paper directs attention to the occurrence of bacillary dysentery in Texas. So far no case of infection with Shiga's bacillus has been recorded. The three cases here reported were all of the Flexner type. Stress is laid upon the necessity of culturing the blood and mucus free from faeces.

P. H. M-B.

Lorenz (Friedr. H.). **Eine Dysenterie-Y-Milchepidemie.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 423–436.

An epidemic of food poisoning resembling in many ways in its dramatic onset paratyphoid or Gärtner infection broke out in an orphanage at Hamburg in August, 1919. Bacteriological investigation proved it to be a Flexner-Y epidemic, in which milk was regarded as the main medium in the spread of the disease.

The rarity of milk-borne dysentery epidemics is to be explained by the fact that these organisms are unable to multiply to any extent in bacteria-free milk, that is to say milk which has been rendered sterile by boiling. The pathogenicity of bacillary dysentery should be regarded not so much from the standpoint of the virulence of any particular strain of organism, as of the amount of the infecting dose of organisms and the mode of their conveyance.

P. H. M-B.

Davison (Wilburt). **Bacillary Dysentery in Children.**—*Bull. Johns Hopkins Hosp.* 1920. July. Vol. 31. No. 353. pp. 225–234.

This report is based upon 134 cases of diarrhoea in Baltimore. Clinically the disease was of a definite type, occurring in well-nourished healthy children whose ages ranged from 3 months to 11 years. In a series of 71 cases there were 15 deaths—a total mortality of 21 per cent. Complications were infrequent. In one case *B. coli* pyelitis supervened, otitis media in two, and hyperpnoea in three. Of the thirteen cases from which a satisfactory stool specimen was received, *B. dysenteriae* (Flexner) was recovered in six, *B. dysenteriae* (Shiga) in one, *B dysenteriae* (Kruse E. or *B. dispar*) in one. Agglutinins of *B. dysenteriae* (Shiga) were demonstrated in two additional patients. Of the 31 cases of clinical dysentery in the hospital wards *B. dysenteriae* (Flexner) was recovered in 18. Agglutinins of Flexner were demonstrated in seven additional cases, and in one further case similar bodies for Shiga.

In other words, infection with *B. dysenteriae* of one kind or other, was shown in over 83 per cent. of cases of clinical dysentery in the hospital during the last year. The ratio of Flexner to Shiga infections was 8 to 1. Using Dreyer's technique and standardized agglutinable emulsions it was found that a titre of 1 : 30 is suggestive, a titre of 1 : 50 diagnostic, of previous or present infection. Neither in a control series of 63 cases of simple diarrhoea nor in 100 normal children could *B. dysenteriae* be isolated from the stools, but the serums of three of the diarrhoea cases showed agglutinins. A curve showing the data of onset of the cases brings out the fact that the majority occurred during the height of the fly season in August.

The author urges that the term ileocolitis in children should be changed to dysentery and the disease made notifiable.

P. H. M-B.

LADE (O.) **Ueber Bacillenruhr bei Säuglingen und älteren Kindern, insbesondere ihre spezifische Behandlung sowie die prophylaktische Dysbakta-Impfung.** [Bacillary Dysentery in Infants and Older Children : Its Specific Treatment and Prophylactic Inoculation with Dysbakta.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. May 7. Vol. 92. No. 2. pp. 321–340. With 1 text fig.

This study was made on 143 cases of bacillary dysentery in children admitted to the author's clinic in Düsseldorf. All diagnoses were made upon clinical grounds, but, owing to " dysentery phobia," in the author's phrase, many other cases found their way to hospital on suspicion ; one, an intussusception in a breast-fed infant, is specially cited.

Thirty-three cases only were positively and bacteriologically diagnosed ; in 9 instances Shiga's bacillus was identified, twice a paratyphoid, and in the 23 remaining instances " pseudodysentery bacilli."

The paratyphoid cases were considered to be examples of a mixed infection. The seasonal incidence of the Shiga-Kruse infections was very marked in 1919, the highest point being reached in October of that year ; and in 1920 in July. House to house infection undoubtedly took place ; in October, 1919, three came from the same house, and seven from neighbouring habitations in the same street ; and in July, 1920, four occurred in neighbouring houses in two other streets. One typical case of dysentery was noted in a new-born child which died on the 19th day. The mother also suffered from dysentery. Many of the dysentery cases in children became chronic. The case mortality rate diminished with increasing age. For the first two years of life it was about 30 per cent., the immediate cause of death being bronchopneumonia. In 19 autopsies, in addition to the characteristic lesions of the large gut, inflammation of the small intestine reaching as high as the jejunum was noted.

On the whole the effect of antiserum treatment (from 20 to 40 cc.) was considered favourable. Prophylactic injections of Boehnke's Dysbacta were given a trial, and as this vaccine had so far not been utilized in children the results are regarded as of some value. Forty children ranging in ages from 1–12 years were injected subcutaneously, with an interval of five days between each injection.

Infants received 0·1–0·3–0·5 cc., those in the second year 0·2–0·5–1 cc., up to the 12th year the dose was 0·3–0·5–1 cc.

A small reaction was noted after the injection. The results are difficult to appraise : of 13 children on whom control observations were made 5 contracted dysentery and, with the exception of 3 in whom the Dysbakta seemed to precipitate a slight attack of dysentery, all the remaining 37 remained quite well.

P. H. M-B.

KUNTZE (Georg). **Ueber Ruhr im Kindesalter.** [Dysentery in Children.]—*Mediz. Klinik.* 1921. Mar. 13. Vol. 17. No. 11. pp. 307–311.

During the summer and autumn months of 1919, 143 instances of bacillary dysentery in children came under Kuntze's care, of which 85 were infants and 58 children over eighteen months of age; the majority of cases occurred during the months of August, September and October. In the case of 11 infants and 10 children the disease arose evidently as a house-infection. In 1920, 48 cases were noted—38 in infants, the remainder in children.

The clinical picture of this disease is by no means characteristic, especially in infants. Abdominal pain and tenesmus may be absent, the stools mucoid and by no means numerous. The differentiation from the milder forms of summer diarrhoea may not be an easy matter.

Shiga's bacillus was not uncommonly isolated. The infectiousness of bacillary dysentery in children is commented upon; many cases occurred in the same family.

The case mortality—41 per cent.—in infants is double the rate recorded in children above 1½ years.

Serum therapy in doses of 10 cc. for infants and double that amount for children proved unsatisfactory.

P. H. M-B.

KOSTRZEWSKI (J.). [In Polish and German.] **Krew chorych na czerwonke pod wzgledem bakterjologicznym.—Bakteriologische Blutuntersuchungen bei Dysenteriekranken.**—*Przegl. Epidemjol.* Warsaw. 1921. Vol. 1. No. 5. pp. 466–470. With 2 charts in text. German summary, p. 471.

Blood cultures with 120 cc. of venous blood to 100 cc. of bile were made on 115 dysenteric patients. In 33, that is 28·69 per cent., Shiga's bacillus was cultivated, in pyrexial as well as apyrexial cases. The dysentery bacillus is therefore not infrequently found in the blood stream, especially in the earlier stages of the illness. As a general rule cases of dysentery baciliaemia are severe cases from a clinical standpoint.

P. H. M-B.

BANU (Gl.). **Sur une forme particulière de dysenterie observée pendant la guerre.**—*Bull. de la Sect. Scient. de l'Acad. Roumaine.* 1920. p. 112. [Summarized in *Hygienische Rundschau.* Berlin. 1921. Oct. 1. Vol. 31. No. 19. p. 588.]

Banu observed 165 cases of bacillary dysentery; of these 133 became chronic and 76 per cent. died. Serum therapy in doses from 60 to 200 cc. injected at short intervals failed, but, according to the author, a specially prepared Flexner vaccine given to 22 cases was followed by more favourable results, and only 3 died; 1/400th to 1/50th of a killed gelatin slope and 1/200th of a living culture are injected. No essential details are given.

P. H. M-B.

FITZ-GERALD (W. E.). **An Outbreak of Bacillary Dysentery in a Boys' School.**—*Lancet.* 1921. Nov. 19. pp. 1051–1052.

This school in Southport has 40 boarders and an attendance of 150 day-boys. The first acute cases, in March, were typical bacillary dysentery. The organisms isolated were typically of Flexner type and were agglutinated by type " Y " serum. The blood serum from seven mild cases agglutinated stock cultures of Flexner-Y up to 1 : 500. There were 10 cases altogether. Probably the source of infection was a carrier. Two boys had come from Bagdad in 1920; from the faeces of one a Flexner-Y organism was isolated. The infection commenced in a mild form and gradually increased in virulence.

P. H. M-B.

JOB (Emile). **La conception actuelle de la dysenterie bacillaire.**—*Arch. Méd. et Pharm. Milit.* 1921. Apr. Vol. 74. No. 4. pp. 368–395.

The author, who has had experience of bacillary dysentery in Morocco, on the British front, and in Macedonia, has now published his more mature reflections upon this disease. Clinically, bacillary dysentery is more severe in Morocco than in France in peace time, while in Macedonia it was more severe than on the French front. The number of stools passed during a period of 24 hours may be taken as an index of the severity of the case, but it should not be the sole one; the author has seen patients passing as many as 80–100 in a day get completely well. At autopsy in the acute forms he has observed hepatic changes, an increase in the volume of the organ being the most striking feature.

He distinguishes four forms, according to the general condition of the patient and the number of stools passed, as mild, average, severe, and toxic. A mild form of colitis frequently seen in Morocco and the East, a form characterized by diarrhoeic stools and bile-stained mucous flakes, is most certainly a mild bacillary dysentery. The diagnosis of bacillary dysentery is most readily made by the removal of some rectal mucus through the sigmoidoscope. Regarding complications, the dysenteric arthritis most frequently affects the knee, it may persist for five or six weeks and be accompanied by muscular atrophy, but finally clears up. Neuritis and even gastric symptoms may, he thinks, be considered as complications. The differential diagnosis from amoebic dysentery is not always easy to make. Contrary to generally accepted pre-war opinion bacillary dysentery often becomes chronic and is prone to relapse. This has been noted in Morocco as well as in German prisoners in France.

In a series of 275 chronic dysenterics neither "vegetative" entamoebae nor their cysts were discovered, and in 49 whose stools were systematically cultured Shiga's bacillus was recovered 21 times. In 147 of the remaining cases the serum reactions gave positive information; 61 times agglutinins of Shiga's bacillus and 12 times of Flexner's bacillus were demonstrated. Mixed amoebic and bacillary infections occur not uncommonly. It was found that one quarter of a series of 169 chronic amoebic dysenterics showed evidence of bacillary infection, as their serum contained Shiga agglutinins. Stress is laid upon the necessity of procuring freshly passed stools for culture in order to determine positive results. He concludes that it is difficult to isolate the bacillus seven days after the commencement of the illness. Shiga infections are the most severe and account for the greater proportion of cases in the tropics, while the less virulent Flexner bacillus is more frequent in northern countries.

[This is a long discursive paper containing a large number of generalizations but little evidence of original work.]

P. H. M-B.

i. Dawson (W. S.) & Moodie (W.). **The Aetiology of Bacillary Dysentery in Asylums.**—*Lancet.* 1921. July 30. pp. 225–226. With 2 charts in text.
ii. Stewart (R. M.). **Aetiology of Asylum Dysentery.** [Correspondence.]—*Lancet.* 1921. Aug. 20. p. 416.

i. In spite of all efforts to control it, dysentery has in the past been the cause of a large amount of the sickness in asylums.

During the year 1919 in 80 county and borough asylums 1,722 cases were notified, and of these 20 per cent. died—forming 3 per cent. of the total number of deaths. Contrary to the accepted view that it is a disease of hot weather and is generally spread by flies, the highest incidence of cases in Claybury occurs during the winter months.

It would appear that asylum dysentery spreads, not so much through flies, as by some more direct method from patient to patient, as by "carriers" of the bacillus.

Relapsing cases are probably carriers; for instance, of 590 patients who have suffered from dysentery in Claybury during the last 12 years, 18 per cent. relapsed once, 6 per cent. twice, and 3 per cent. three times. In mild cases the dysentery bacillus disappears from the faeces in a few days, but reappears directly a relapse occurs.

To ensure the complete eradication of the disease from asylums it would be necessary to carry out a complete scheme of permanent isolation, as is at present being done at Claybury.

A bacillus of the Flexner type was cultivated from the faeces by the usual methods. At one autopsy, although ulceration of the intestine existed as high up as the duodenum, only cultivation from the rectal contents yielded the bacillus.

By employing the Oxford antigen of Dreyer, it was ascertained that the first trace of agglutinins appeared at the end of the sixth week, but had disappeared entirely at the end of the fourteenth. With Dudgeon's antigen positive agglutination results were obtained at the beginning of the fourth week.

ii. In reply to the paper by Dawson and Moodie, Stewart maintains that recent experimental researches on the influence of accessory food factors upon nutrition has lent a new aspect to the subject of asylum dietaries. May not dysentery, or the liability to the disease, be due partly to an inadequate supply of vitamins?

The chronic demented lunatic is specially liable to dysentery, and it is a familiar fact that the attendants and nursing staff of asylums are seldom attacked. A supply of a well-balanced diet for the insane becomes increasingly difficult to obtain during the winter months, and possibly it is due to this fact that the incidence of dysentery is highest during that period.

P. H. M-B.

Janowski (W.). **Quelques remarques sur l'étiologie de la dysenterie.**—*Paris Méd.* 1921. Aug. 20. 11th Year. No. 34. pp. 152–154.

Janowski considers the aetiology of dysentery to be in an unsatisfactory state. Clinicians, he says, all the world over have been struck by the facts that two or three pathogenic bacteria may be present in the stools at the same time; that although a large number of organisms may be considered pathogenic, nevertheless their presence can be verified only in a quarter or a third of the clinical cases of the disease; and that further confusion has resulted from the varied interpretations of the serum reactions. Considerable diversity of opinion exists as to the efficacy of antidysenteric serum. The remaining objections, related *in extenso,* are not easy to follow.

P. H. M-B.

HERMEL. **Beiträge zur Klinik, Bakteriologie und Therapie von Bazillenträgern der Typhus- und Ruhrgruppe.** [The Management, Bacteriology and Treatment of Bacillus Carriers of Typhoid and Dysentery.]—*Beiträge zur Klinik der Infektionskr. u. Immunitätsf.* 1919. Vol. 8. p. 176. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. p. 251.]

A summary of work performed at Spa during the German occupation. Here lay the concentration camp for all convalescents from typhoid and paratyphoid and dysentery. The investigations were carried out over a period of four years and concerned 34,100 patients convalescent from enteric, and 5,000 from dysentery. The percentage of chronic carriers of *typhosus* was found to be 0·25 per cent., that of *paratyphosus* B, 3·9 per cent., and of *paratyphosus* A, 2·2 per cent.

Direct plating of the faeces gave the best results. Organisms of the enteric group were found to be present in the mouth-cavity of carriers and even healthy individuals; they were also found in inflammatory lesions.

Attempts to treat and sterilize carrier cases did not meet with success. Before one should pronounce a chronic carrier as free from infection it is advisable to cultivate the bile obtained by means of a duodenal sound.

P. H. M-B.

MEGAW (J. W. D.). **Chronic Dysenteric Peritonitis.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 321–323.

Under this title the subject of ascites, so common in Indian hospital practice, is discussed. So far no satisfactory explanation of the frequency of these cases has been forthcoming; they have been attributed to alcohol, malaria, or syphilis, on grounds which are entirely inadequate.

Notes of 61 cases were obtained in a period of two years; more than half the patients were between 25 and 40 years of age. Children are rarely affected, while old people are quite commonly attacked. Most cases gave a history of dysentery or diarrhoea previous to the onset of ascites. The ascites is probably due to a general fibrous peritonitis, brought about by the passage of dysenteric toxins through the gut wall.

Dysenteric peritonitis is prone to supervene in dysentery cases treated by opiates or in those in which treatment has been altogether neglected. On the other hand, peritonitis is unlikely to supervene in cases treated on an adequate and rational basis, but when once established prospects of cure cannot be entertained.

The results of agglutination tests (microscopic method) were rather variable. Out of 40 cases, 23 agglutinated Flexner's bacillus, 4 Shiga's bacillus, and 6 *Bacillus coli.* Twenty-seven were examined as controls, 7 of which agglutinated Flexner, 1 Shiga and 1 *Bacillus coli.* The duration of this disease is generally under a year; probably the average is less than six months from the first appearance of ascites. Vaccine treatment with Flexner's bacillus was unsuccessful; omentopexy gave encouraging results in one case only. At autopsy a general fibrotic thickening of the peritoneum in the upper part of the abdomen is observed; in one only out of five was there any degree of hepatic cirrhosis. Numerous adhesions between the viscera are usually present, and the large intestine may show signs of recent scarring and ulceration. A plea is issued for more systematic research on this subject.

P. H. M-B.

LICHTENSTEIN (A.). **Een geval van chronische bacillaire dysenterie, type Shiga-Kruse.** [A Case of Chronic Bacillary Dysentery, Shiga-Kruse Type.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 1. pp. 41–45.

A sailor had in four months' time four attacks of dysentery, during the last of which B. Shiga-Kruse was cultured from the stools. There is no certainty whether the same was present in the former attacks (the first two of which were cured by emetine), and it is not reported whether the bacillus was present in the stools some period after the patient had recovered from the last acute attack. The case could scarcely be considered as one of real chronic bacillary dysentery.

Chronic Shiga-Kruse dysentery is very rare in the Dutch East Indies. SNIJDERS found one case during the epidemic at Tanah Poetih (see this *Bulletin,* Vol. 16, p. 9).

W. J. Bais.

BURKITT (R. W.). **The Use of Rhubarb in Acute Bacillary Dysentery.** [Correspondence.]—*Lancet.* 1921. July 30. pp. 254–255.

In Nairobi it has been the custom during the last three years to treat acute bacillary dysentery with powdered Turkey rhubarb root (*pulv. rhei rad.*).

The dose is half a teaspoonful every one, two, or three hours until the drug appears in the stools. To children small and frequent doses should be given (gr. 5 every two hours for three consecutive doses). " No one who has ever used rhubarb would dream of using anything else."

P. H. M-B.

CHIARI (O. M.). **Zur chirurgischen Therapie der Ruhr.** [The Surgical Treatment of Dysentery.]—*Mediz. Klinik.* 1921. Feb. 27. Vol. 17. No. 9. pp. 243–245.

This paper takes the form of a clinical lecture setting forth the advantages to be derived from appendicostomy in long-standing bacillary cases with incessant diarrhoea.

The consideration that in quite 2 per cent. of bacillary dysentery cases the disease became chronic, added to the fact that bacillary dysentery raged in Germany during the latter years of the war to a hitherto quite unprecedented extent, has contributed to the importance of this subject at the present time. The appendicostomy should be performed under local anaesthesia, and the bowel subsequently washed out with 0·5 per cent. copper sulphate or 2 per cent. tannic acid solution.

The author develops arguments for his belief that appendicostomy should be more freely undertaken in the earlier stages of the disease, and not, as is the practice at present, when the outlook has become hopeless. Opinion seems to be divided whether caecostomy, or left inguinal colotomy, offers more advantages than the more simple operation of appendicostomy; the author believes that the latter operation is preferable in chronic cases, while in more acute cases caecostomy is the more efficient.

P. H. M-B.

DANYSZ (J.). **Traitement des dysenteries microbiennes par des entéro-antigènes non spécifiques: quelques réflexions sur les réactions provoquées par les microbes de la flore intestinale normale.**—*Presse Méd.* 1921. May 7. Vol. 29. No. 37. pp. 362–363.

During the summer of 1920 a considerable epidemic of dysentery reigned in Poland. The country was ripe for development of all kinds of diseases after six years of war and the passage of large numbers of troops of all nations through the land.

Owing to the conditions existing it was not possible to determine the exact type of dysentery prevailing, and the author limits himself to philosophical deductions as the result of the apparently successful treatment of large numbers of cases by means of an entero-antigen compound of *B. coli*, enterococci, diplococci, and *B. proteus*, organisms in no way concerned in the etiology of the disease. The emulsion of these organisms, heated to 80°–100° C., was ingested by the mouth or injected per rectum in a dosage of several hundred milligrammes.

The exact manner in which these non-specific antigens exert a beneficial action is not understood; it may be that by direct action upon the liver they increase the biliary secretion. At any rate the author has convinced himself that the entero-antigens act directly by stimulating all internal secretions.

P. H. M-B.

CREIGHTON (Catherine), WAGNER (C. E.) & DAVISON (Wilburt C.). **The Isolation of *B. dysenteriae* (Flexner) from the Urine of an Infant with Dysentery.**—*Bull. Johns Hopkins Hosp.* 1921. Feb. Vol. 32. No. 360. pp. 50–51.

Dysentery bacilli have rarely been found in the urine of dysentery patients.

The case reported shows that a typical *B. dysenteriae* (Flexner) was found as a result of routine cultures in the catheterized urine of a child with bacillary dysentery, uncomplicated by vaginitis, pyelitis, cystitis, or other urinary complication.

The patient's serum agglutinated the bacillus in question up to a dilution of 1 : 100.

P. H. M-B.

SIKL (Hermann). **Bakteriologische Untersuchungen am pathol.-anatomischen Material von Bazillenruhr.** [Bacteriological Examinations made on Post-mortem Material in Bacillary Dysentery.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 337–386.

Dysentery bacilli can generally be cultivated with ease at autopsy from the necrotic mucosa, so that probably many intestinal diseases whose etiology has hitherto remained unrecognized, and which differ considerably in their gross pathological appearances, are in reality various forms of bacillary dysentery.

Bacillary dysentery may be so slight as to excite merely a catarrhal inflammation of the mucosa of the large intestine.

Chronic dysentery is generally of a relapsing character, and from the lesions at autopsy, by the employment of suitable technique, dysentery bacilli can be cultured; on this account chronic sufferers from this disease should be regarded as infectious to others. The mucous retention—cysts and submucous abscesses in chronic dysentery—should be regarded as reservoirs for the dysentery bacilli during latent periods of the disease. Diarrhoeic and dysenteric attacks during the course of tuberculosis, malaria, and septic diseases are often caused by recrudescence of a hitherto unrecognized bacillary dysentery infection.

P. H. M-B.

JACOBY (Fritz). **Die Bedeutung der Azidität der Ruhrstühle für die bakteriologische Ruhrdiagnose.** [The Importance of Acidity of Dysenteric Stools for Bacteriological Diagnosis.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 1–21. With 4 figs.

The acid reaction of the dysentery stool occurs quite independently of the presence of dysentery bacilli in that particular specimen. The reaction depends upon other factors, such as the *consistency* of the stool, the nature of the humoral exudate from the body, and the nature and number of other micro-organisms. To a less degree the chemical composition of the food and the products of digestion exert their influence. The higher the temperature the more acid does the stool become.

It is a bacteriological commonplace that dysentery bacilli can only be isolated from an acid stool with difficulty, and the more marked this reaction, the more difficult the process becomes. It is this acidity which is so deleterious to the organism; therefore, dysentery bacilli can be cultured without difficulty only from stools which have recently been passed.

P. H. M-B.

FUKUHARA (Yoshimoto). **A New Method of Testing Antitoxic Dysentery Serum.**—*Jl. of Immunology.* 1919. Sept. Vol. 4. No. 5. pp. 299–307.

The antitoxic value of an anti-dysenteric serum can best be estimated by preserving it in a dry state in vacuum tubes. The standard antitoxin unit adopted is the amount required to neutralize 100 minimum lethal doses of toxin; the latter may be estimated as the amount which when mixed with a unit of anti-toxin and injected intravenously into a rabbit of 1,500–2,000 gm. in weight, caused the death of the animal within four or five days. Deterioration of dysentery toxin can be attributed to a change of the toxin molecule into a non-toxic modification which possesses no avidity for the antitoxin. The toxin molecules lose their toxicity without the formation of toxoids, differing from the diphtheria toxin in this important respect.

P. H. M-B.

GRAHAM (Stanley G.). **The Bacteriology of Infectious Diarrhoea.**—*Canadian Med. Assoc. Jl.* 1921. Aug. Vol. 11. No. 8. pp. 529–531.

In a series of 29 cases of infectious diarrhoea at the Hospital for Sick Children, Toronto, studied during the summer of 1920, 62 per cent. were proved by cultural methods to be due to a dysentery bacillus of the HISS-RUSSELL type. In stools obtained early in the disease pus cells were always present. Stools were examined daily until it was proved that a dysentery organism had been isolated. In direct smears of early cases the predominating organism was a Gram-negative bacillus. This fact alone was of value in making a tentative diagnosis of dysentery.

P. H. M-B.

SCHMITT (Hans). **Das Verhalten der Ruhrbazillen und der Typhus-Coli-Bazillen in eiweissfreien Lackmusnährböden.**—[The Behaviour of Dysentery, Typhoid and Coli Bacilli in Albumen-Free Litmus Media.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Apr. 1. Vol. 86. No. 2. pp. 119–123.

It has been stated that in sugar solutions in which albumen-free litmus is used as indicator the typical reactions of the typhoid-coli group do not take place. This does not hold good, at any rate, as regards the bacilli of the dysentery group. In some strains, however, the change in colour does not take place for some considerable time.

The experiments of VON WERDT and KOPATSCHEK—to which the author's attention was directed, but with whose conclusions he does not entirely agree—are based upon correct principles, namely that the exact composition of the nutrient medium as well as that of the indicator should be standardized.

P. H. M-B.

WOLF (G.). **Ueber das wechselnde kulturelle Verhalten von Ruhrstämmen auf den zur Differentialdiagnose angegebenen Zuckernährböden.**—[The Varying Behaviour of Dysenteric Strains in Cultures on Sugar Media devised for Differential Diagnosis.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 476–480.

None of the strains of Shiga-Kruse bacilli investigated produced acid in mannite; on the other hand, no strain of Flexner-Y has failed, when tested over a sufficiently long period, to produce acid in this sugar.

In the differentiation of the dysentery organisms it is not sufficient to rely upon the sugar reactions. It is no longer practical or scientific to differentiate between Y and Flexner strains; nor is it possible to obtain a sharp differentiation between them by means of immune serums; they should therefore be designated as the Flexner-Y group, in contradistinction to the Shiga-Kruse group.

P. H. M-B.

TWORT (F. W.). **Researches on Dysentery.**—*Brit. Jl. Experim. Path.* 1920. Oct. Vol. 1. No. 5. pp. 237–243. With 1 plate.

Three types of organisms characterized by special forms can be isolated from dysentery and allied bacilli. The forms termed type A are thick, long bacilli which may become twisted like a spirochaete; type B are long, thick rods, swollen in the middle or at one end; bacilli of type C are similar to B, but are shorter. In older cultures most of the units are globular and the protoplasm may collect in a semilunar mass. A filter-passing material capable of watering down individual bacilli into granules may be present in cultures of dysentery bacilli, a process which resembles the phenomenon described by d'HÉRELLE [see this

Bulletin, 1918, Vol. 11, p. 262]. The special types A, B and C are produced by normal bacilli when grown upon a special medium (beef extract, 2 per cent. agar with 0·1 per cent. sodium bicarbonate, 0·5 per cent. litmus solution and 0·5 per cent. maltose). These forms are probably not stages in a true life-cycle, but are possibly concerned with the incubation period of the disease, successful infection, and the production of immunity.

P. H. M-B.

ZOELLER (Chr.). **Bacille de Shiga auto-agglutinable.**—*C. R. Soc. Biol.* 1921. Jan. 15. Vol. 84. No. 2. pp. 87–88.

An artificial culture of Shiga's bacillus is here under discussion. It was first noticed that when grown in broth flocculi form at the bottom of the tube ; the bacillus is in fact auto-agglutinable. In other respects it is a typical Shiga bacillus ; it ferments glucose, and is lethal to rabbits on intravenous injection, and when recovered from the peritoneal exudate of the experimental rabbit preserves these characteristics, which, indeed, persist even after frequent subculture.

P. H. M-B.

ZOELLER (Chr.). **Bacille de Shiga auto-agglutinable (caractères sérologiques).**—*C. R. Soc. Biol.* 1921. Nov. 5. Vol. 85. No. 31. pp. 800–801.

A short account of a culture of Shiga's bacillus isolated during routine bacteriological work, which was found to clump automatically in normal saline as well as in physiological saline. A twenty-four hours' culture is emulsified in 5 per 1000 saline. The flocculi formed are fine and granular and can be easily broken up by gentle agitation of the tube. Complement-deviation tests, using this atypical bacillus and a typical Shiga organism as antigens, indicated that in both strains the behaviour was identical. A cross immunity can be produced in rabbits by injection of cultures of these organisms. Attempts to transform the bacillus into the typical form did not meet with success.

P. H. M-B.

WOLLSTEIN (Martha). **Studies on the Phenomenon of d'Hérelle with** *Bacillus dysenteriae.*—*Jl. Experim. Med.* 1921. Nov. 1. Vol. 34. No. 5. pp. 467–476. With 5 plates.

A lytic fluid for dysentery bacilli can be obtained from the peritoneum of the guinea-pig by intraperitoneal injection of live dysentery bacilli ; it is not exactly specific for dysentery organisms, as it exerts a group action upon the dysentery-colon-typhoid group.

The action of this fluid on dysentery bacilli, both *in vivo* and *in vitro*, is to divide the culture into sensitive and resistant strains ; the latter can be carried to a degree of very marked and almost complete resistance to lysis. The sensitive strains are both lysogenic and agglutinable. These bacilli gradually lose this lysogenic property, but very resistant ones never acquire it ; and it is possible that the resistant bacilli are responsible for the fatal disease in human beings.

There is evidence that d'Hérelle's phenomenon goes on in the human intestine in patients suffering with dysentery. That phenomenon is the expression of a lytic reaction occurring between an infecting bacterium and a substance elaborated in the organism infected, probably by the leucocytes and other tissue cells, in response to the invasion.

Lysis of cultures of B. Shiga is convincingly demonstrated in the plates illustrating this work.

P. H. M-B.

Bail (Oskar). **Ueber Shiga-Bakteriophagen.**—*Wien. Klin. Woch.* 1921. Nov. 17. Vol. 34. No. 46. pp. 555–556.

Of all the bacteria so far studied, Shiga's bacillus is most easily destroyed by bacteriophagic substances, originally discovered by d'Hérelle in extracts of dysentery stools. The author's investigations were made with two filtrates, to which distinctive names were given—one of which was active against cultures of Shiga's bacillus in dilutions as high as 1 : 1,000 million. A bacteriophagic filtrate does not increase in power if incubated in bouillon, but if living Shiga bacilli are added after a latent period the bacteriophagic power of the fluid becomes greatly augmented.

There are several bacteriophagic substances, and the author claims that from one of his extracts he has succeeded in separating two. These can be distinguished from one another by their action upon cultures of Shiga's bacillus. Broth which has been inoculated with Shiga's bacillus and has become cloudy clears in a couple of hours when inoculated with a bacteriophagic extract. Not all individual bacilli of the same culture are affected by the bacteriophage in the same manner, and by selecting such organisms it is possible to cultivate a strain which is resistant to bacteriophagic action. An interesting development of this line of work has recently taken place; it has been found that bacteriophagic substances may appear in cultures of normal organisms in pure culture. For this purpose the organisms must be cultured in bouillon and frequently precipitated by centrifugation; finally a stage is reached when no more growth will take place in the clear fluid. It is then heated to 58° C. Injection of bacteriophagic fluids into rabbits will produce an antibacteriophagic serum.

P. H. M-B.

Hausherr (Otto). **Beitrag zur Frage der physiologischen Agglutination von Y-Ruhrbazillen.**—[Physiological Agglutination of the Y-Dysentery Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Oct. 15. Vol. 87. No. 2. pp. 95–109.

The author has confirmed the observations of Loewenthal [this *Bulletin,* Vol. 17, p. 177] upon the agglutination in high titre of Y-dysentery bacilli by the serum of pregnant women. The titre varies greatly in the case of different strains of the bacillus; in the serums investigated by the author 37 per cent. agglutinated a culture of the bacillus in a dilution of 1: 100 during a period of two hours.

A doubtful agglutination sometimes takes place when similar physiological serums are tested against the Shiga-Kruse bacillus and the cholera vibrio; on the other hand, typhoid bacilli are unaffected.

The peculiarity of "pregnant" sera in this respect is not easily explained; at any rate it is in no way correlated with the typhoid content of the serum. This agglutination is *not* specific, and occurs quite independently of any connexion with the disease dysentery. It depends, probably, upon some subtle physiological property of the bacillus, and is to be regarded in the same light as the physiological agglutination of red blood corpuscles by strange sera.

P. H. M-B.

LOEWENTHAL (Waldemar). **Berichtigung zu meinen "Erklärungsversuchen für die Ruhragglutination durch Schwangerenserum."**—[Correction to the Author's Paper, "Attempts to explain the Agglutination of Dysentery Bacilli by the Serum in Pregnancy."]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil Orig. 1921. Vol. 31. No. 4/5. pp. 454–455.

Apparently, in comparing the phenomena he observed in the agglutination of dysentery bacilli by the serum of pregnant women with the acid agglutination of MICHAELIS, the author has made a fundamental error in the interpretation of the hydrogen-ion concentration theory, and this he now explains [see this *Bulletin*, Vol. 17, p. 177].

P. H. M-B.

STAWELL (R. R.). **The Treatment of Bacillary Dysentery.**—*Med. Jl. Australia.* 1921. June 18. 8th Year. Vol. 1. No. 25. pp. 496–497.

The unsuitability of milk in the acute stages of bacillary dysentery, both in adults and infants, is the main theme of this paper.

P. H. M-B.

MIXED AND UNCLASSED DYSENTERY.

DEW (H. R.) & FAIRLEY (N. Hamilton). **The Dysenteric Infections.**—*Med. Jl. Australia.* 1921. June 4. Vol. 1. 8th Year. No. 23. pp. 453–460. With 7 text figs.

This paper, based mainly upon military experience, summarizes modern knowledge upon the etiology, pathology and treatment of the dysenteries. A table is given summarizing the laboratory examination of 1,816 consecutive specimens of faeces from patients in the 14th Australian General Hospital in Cairo.

		Positive.	Negative.	Total.
Bacillary	B. Shiga	41	229	326
	B. Flexner	56		
Protozoal	Amoebae:		1,025	1,371
	E. histolytica	97		
	Cysts of *E. histolytica* ..	82		
	Flagellates:			
	Lamblia intestinalis ..	39		
	Tetramitus mesnili ..	64		
	Trichomonas intestinalis	63		
	Ciliates:			
	Balantidium coli ..	1		
Helminthic	*Bilharzia mansoni* ..	33	87	120

At first sight it would appear that the percentage of positive findings in this series is not high; the observations were conducted at a base hospital situated at the end of a long line of communications. In consequence many patients were convalescent on arrival, with normal stools. Successful isolation of dysentery bacilli could, under the circumstances, hardly be expected. The other anomaly demanding explanation is the apparent preponderance of amoebic over bacillary infections. These findings are not to be taken as representing the true incidence of these two diseases in the War zone, where bacillary dysentery was the more frequent disease.

The appearance of the bacillary dysentery stool under the microscope is characteristic. These observers note certain stigmata of toxic spoiling such as karyolysis, pyknosis of nuclear material and fatty cytoplasmic degeneration in the polymorphonuclear pus cells. Macrophage cells were extremely common, especially in the later and healing stages of the disease; in 34 consecutive cases examined they were present in 18.

Studies upon the pathology of bacillary dysentery were based upon a series of 250 autopsies, mostly Egyptian cases. The outstanding features of rapidly fatal cases were an acute inflammation of the superficial layers of the colon and sometimes of the lower third of the ileum and the stigmata of toxic spoiling of the viscera. In one instance B. Flexner was isolated from a splenic abscess; the patient was infected with relapsing fever as well. Myocarditis and serous pericarditis were commonly observed. In amoebic dysentery, owing to the nature of the ulcers and the tendency to thrombosis, local complications are common. In this series of cases there were seven deaths from perforation secondary to gangrenous colitis. Surgical interference would appear to be hopeless. In the treatment of hepatic abscess the authors suggest that it is futile to explore the liver with a needle of the ordinary calibre; difficulty may be experienced in aspirating the pus, despite the fact that the needle is in the abscess.

P. H. M-B.

PATTERSON (S. W.) & WILLIAMS (F. E.). **Epidemic Diarrhoea. A Preliminary Account of Observations made in Melbourne during the Summer Months, 1920–1921.**—*Med. Jl. Australia.* 1921. June 4. Vol. 1. 8th Year. No. 23. pp. 460–464. With 6 text figs.

The material in the present study was derived from 90 cases of epidemic diarrhoea occurring from March to November in Melbourne General Hospital. The clinical features of these cases were of the most diverse kind. The actual numbers and types of pathogenic organisms recovered were :—

	Cases.
Entamoeba histolytica	4
B. dysenteriae, Flexner	18
B. dysenteriae, Shiga	1
B. suipestifer	5
B. morgan No. 1	4
Streptococcus haemolyticus	1
B. tuberculosis	1

From six patients showing clinical signs of dysentery a type of organism was isolated resembling that described in Denmark by SONNE and in Norway by THJOTTA.

P. H. M-B.

HURST (Arthur F.). **The Diagnosis of Dysentery by the Sigmoidoscope.** [Correspondence.]—*Lancet.* 1921. June 4. p. 1211.

This correspondence has been evoked by the paper of MANSON-BAHR and GREGG [see this *Bulletin*, Vol. 18, p. 35]. Hurst has had the privilege of examining cases in which actual ulceration of the bacillary type was present. The appearances are identical with those observed in ulcerative colitis; the ulcers are shallow, irregular in outline, of varying size, and separated by a swollen and congested mucous membrane; in contrast to these, amoebic ulcers are more regular in shape. It is possible to watch from day to day the healing of amoebic ulcers with emetine treatment and those of bacillary origin with antidysenteric serum.

P. H. M-B.

LOCKHART-MUMMERY (J. P.). **The Diagnosis of Dysentery by the Sigmoidoscope.** [Correspondence.]—*Lancet.* 1921. June 25. p. 1381.

This correspondent emphasizes the value of a sigmoidoscopic examination, not only as an aid to diagnosis, but as a valuable means of appraising treatment. It is easy to distinguish between the ulceration of amoebic and bacillary dysentery, although their symptomatology may be similar. Other types of ulceration of the colon may be distinguished. When cases of chronic dysentery of either type are systematically examined with the sigmoidoscope, it is found that they are frequently followed by an ulcerative colitis, which is much more chronic than is the original disease. These severe secondary ulcerations of the colon clear up very satisfactorily after an appendicostomy, which must not be done as a last resort.

P. H. M-B.

GRAHAM (George). **Arthritis in Dysentery: Its Causation, Prognosis and Treatment.**—*Proc. Roy. Sec. Med.* (Sect. of Med.). 1919. Dec. Vol. 13. No. 2 pp. 23–42. With 5 charts in text.

The first symptom of arthritis was severe pain preceding by some hours the swelling of the joint. The effusion took place quickly and was usually large in amount without reddening of the skin. In some instances many joints were attacked on the same day; generally, however, they were involved at intervals. The joint most often affected was the knee—both knees in 16 and one in 15 cases; ankles and elbows came next in frequency; the smaller joints of wrists and hands were symmetrically affected in three cases; in five, one hand only was attacked; in one, the sternoclavicular joint.

Generally speaking, the onset took place before the twelfth day of illness, in some between the twelfth and twenty-ninth, and in one exceptional case on the ninetieth, 13 days after a relapse of dysenteric symptoms. Arthritis was usually accompanied by long-continued pyrexia. The progress of the cases varied very greatly; when the joint effusions subsided quickly there was seldom any after-trouble; in other cases stiffness remained, but it is believed that ultimately all joints recover completely.

Eye symptoms of two kinds were noted in association with arthritis: (*a*) a subacute conjunctivitis unaccompanied by any purulent discharge, and occasionally with photophobia, and (*b*) a cyclitis or an iridocyclitis appearing between the fourteenth and thirty-fourth day of the disease (in one case on the eighty-eighth), sometimes a few days before or after the involvement of the joints. The conjunctivitis cleared up quickly with 2 per cent. argyrol washes, while the irido-cyclitis yielded to atropine. In one case, however, ring synechiae resulted, and an iridectomy had eventually to be performed.

The question whether the administration of serum prevents the involvement of the joints is difficult to answer. The treatment of dysenteric arthritis is unsatisfactory. Sodium salicylate, even in doses of 20 gr. every two to four hours, has little apparent effect upon the joint effusions or the pyrexia. The injection of anti-dysenteric serum has apparently no effect.

P. H. M-B.

CANTLIE (James). **Post-Dysenteric Colitis: the Seat of the Lesion and its Treatment.**—*Practitioner.* 1920. Mar. Vol. 104. (No. 621.) No. 3. pp. 161–166.

This paper contains no new information, but recapitulates the author's well-known views on such subjects as the existence of a recto-sigmoid pylorus, the uses and manipulation of the sigmoidoscope, and the cauterization of the lower bowel with pure carbolic, followed by saline enemata, in the treatment of the condition inaccurately known as post-dysenteric colitis.

P. H. M-B.

BONNET (P.) & MICHON (L.). **Appendicular Symptoms in Dysentery.**—*Lyon Chirurgical.* Lyons. 1921. Jan.–Feb. Vol. 18. No. 1. p. 14. [Summarized in *Jl. Amer. Med. Assoc.* 1921. May 14. Vol. 76. No. 20. p. 1372.]

Symptoms suggesting appendicitis are often the precursors of an exacerbation of a latent dysentery. The authors report a fatal case of gangrenous perforation of the caecum of amoebic origin, suggesting, of course, the diagnosis of appendicitis during life. This case is one more exhortation that in the tropics the stools should always be microscopically examined for entamoebae in any suspected case of appendicitis.

P. H. M-B.

MAXCY (Kenneth F.). *Giardia (Lamblia) intestinalis.* **A Common Protozoan Parasite of Children.**—*Bull. Johns Hopkins Hosp.* 1921. May. Vol. 32. No. 363. pp. 166–170.

The material examined came from one of the clinics of the Johns Hopkins Hospital. The results are confirmatory of observations elsewhere, *Giardia intestinalis* being found to be present in the intestine of a large percentage of apparently normal children.

A. A.

BOYD (William). **The Detection of** *Lamblia (Giardia) intestinalis* **by Means of the Duodenal Tube.**—*Canadian Med. Assoc. Jl.* 1921. Sept. Vol. 11. No. 9. pp. 658–660.

The object of this paper is to suggest a simpler and more reliable method of finding Lamblia than by mere faeces examination.

A duodenal tube was passed upon a convalescent typhoid case, with the object of testing whether he was or was not a carrier of the disease. By means of Lyon's magnesium sulphate method the contents of the gall-bladder and duodenum were obtained. The observer was astounded at the number of active *Lamblia intestinalis* he found in the fluid. The bile itself was clear and perfectly normal and on culture yielded a pure growth of the typhoid bacillus.

A month later he was re-examined by the same method, but, though the bile was swarming with typhoid bacilli, no Lamblia were present.

It is probable that Lamblia infections can be more readily diagnosed by means of the duodenal tube than by faeces examination.

P. H. M-B.

CADE (A.) & HOLLANDE (A.-Ch.). **L'entérite à** *Giardia* (*Lamblia*) *intestinalis*.—*Arch. mal. app. dig. et nutrition.* Vol. 10. pp. 193–222. [Summarized in *Bull. Inst. Pasteur.* 1921. May 15. Vol. 19. No. 9. pp. 323–324.]

The conclusions are based upon a study of 10 cases. The pathogenicity of the parasite (*Lamblia intestinalis*) can hardly be a matter of doubt any longer. Diarrhoea is the most usual symptom, but GOIFFON and ROUX have reported appendicitis caused by this parasite, while FAIRISE, JANNIN and JACQUOT actually cite a fatality due to intestinal lambliasis.

P. H. M-B.

PRENTISS (Elliott C.). **Infection with the Flagellates.**—*New Orleans Med. & Surg. Jl.* 1921. Oct. Vol. 74. No. 4. pp. 232–244.

Of 112 private patients examined, 12 or 10·7 per cent. had a Trichomonas infection. Probably many people harbour these parasites without any harm resulting; on the other hand (so the author avers), they may produce a very severe, if not fatal, catarrh of the whole intestine. The remainder of this paper is of no scientific value.

P. H. M-B.

BLOCK (M.). **Treatment of** *Trichomonas intestinalis* **with Methylene Blue.**—*Nebraska State Med. Jl.* Norfolk. 1920. Dec. Vol. 5. No. 12. p. 354. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Jan. 22. Vol. 76. No. 4. p. 271.]

Methylene blue was given freely by the mouth and as a rectal irrigation—by the mouth in a total of 9 gr. daily, in three doses of 3 gr.; by the rectum in a dose of 10 gr. to the quart of hot water morning and evening. Rest in bed and liquid diet were enforced. This treatment was kept up for five days and resumed after a brief interruption for a similar period, after which the diarrhoea had subsided and the flagellates had disappeared.

P. H. M-B.

NOC (F.) **Les dysenteries et les entérites infectieuses et parasitaires.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 5–38. With 2 plates.

This paper, illustrated by two extremely poor plates of amoebae and the intestinal flagellates, is a review of the recent literature of dysentery, which has already been adequately reviewed in this *Bulletin.*

P. H. M-B.

SPRUE.

HANNIBAL (Edna A.) & BOYD (Mark F.). **The Monilias of the Gastro-Intestinal Tract in Relationship to Sprue.**—*Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 165–180. With 4 text figs.

The material for this study consisted of five cases of undoubted sprue occurring in Texas. Details of three cases are given in addition to the two formerly reported (Boyd 1920). One was complicated by pulmonary tuberculosis; all except one had tongue symptoms, and three had patches of thrush on the buccal mucosa.

Thirty-four cases suffering from a variety of medical ailments were investigated as controls; monilias were isolated from seventeen. The method used for isolating these organisms from the faeces was similar to that described by ASHFORD. Routine tests were performed for every monilia isolated with seven carbohydrates in a basic medium of peptone water, viz., levulose, galactose, saccharose, mannite, maltose, lactose, and dextrose; the fermentation tests being recorded after five days, when they became constant. It was found that by using peptone water uniform results were secured, regardless of the length of time a strain had been under artificial cultivation; whereas meat extracts used as basis give by no means constant results.

Precise observations indicated that monilias isolated from 22 cases (5 sprue patients and 17 controls) conformed to the description of Ashford's *Monilia psilosis.*

A limited number of feeding experiments were made with guinea-pigs which suggested that in some instances this monilia could produce an acute gastro-enteritis. Yeast cultures corresponding to *M. psilosis* were recovered from cases of thrush, and their identity with that species appeared more than probable.

The conclusions arrived at as the result of this study are by no means decisive. On the whole they suggest that *Monilia psilosis* is not the cause of sprue, by reason of the fact that 50 per cent. of controls, including the thrush cases, were harbouring the same organism as was recovered from sprue. Some factor besides the mere presence of monilia in the intestinal tract is evidently at work in the production of sprue.

P. H. Manson-Bahr.

BIRT (Ed.). **Amöben und Sprue.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 131–141.

This paper is a lengthy dissertation of the author's conviction, unsupported by any cited cases or experiments, that *Entamoeba histolytica,* or, rather, amoebiasis of the intestine, is the precursor of sprue. He states that in every case of sprue, sooner or later, blood and mucus containing the active amoeba is passed. Long-continued amoebiasis leads to a degeneration of the mucosa of the gut.

The mouth symptoms are said to be greatly alleviated by a mouthwash containing emetine. For adults he finds the following treatment useful:—

℞.

Pulv. salol	0·1 gm.
„ resorcin	0·01 „
„ emetine	0·01 „
„ cocaine	0·01 „
„ strychnine sulphate..	0·001 „

in pills three times a day after meals for ten days at a stretch. Dietetic restrictions are, of course, necessary. The majority of cases seen in Shanghai are of European origin, though the disease occurs also in Chinese.

[The reviewer has observed in one case during the last year symptoms of sprue supervening upon a long-standing amoebic dysentery.]

P. H. M-B.

BOVAIRD (David). **A Study of Tropical Sprue, or Psilosis.**—*Jl. Amer. Med. Assoc.* 1921. Sept. 3. Vol. 77. No. 10. pp. 753–757. (Discussion pp. 757–758.)

" Tropical " sprue may be found from Ceylon to Northern Korea, from Porto Rico to New Hampshire. Of the author's cases three were women and ten were men, their ages ranging from 37 to 57 years. Their sojourn in foreign parts before developing symptoms varied from two to thirty years. Two returned to America in good health, and first noted symptoms four months after their return.

The mouth lesions in sprue are of considerable variety, and none of them in any respect resembles the picture produced by *Monilia albicans*. From none of the aphthous ulcers of sprue has the author been able to isolate a monilia of any type. The specific organism causing the disease has not yet been discovered. Only once in this series of 13 patients has monilia been found in the stools. One case proved fatal, and showed various lesions, such as a specific aortitis, quite unconnected with the disease sprue. A chronic enteritis of the mucous type was present, and the pancreas was normal in gross appearance and in microscopic sections.

As regards the clinical phenomena, the author has never noted the shrinkage in the liver dulness upon which stress is laid by some writers; the liver but shares the loss common to all the viscera. Proctoscopic appearances are by no means characteristic; in some the mucosa was normal, in some it was pale, in others it was the colour of raw beef. Six only of twelve gastric analyses showed complete absence of hydrochloric acid. In four patients stool analysis showed total fat varying from 25 to 48 per cent. of the dried faeces; neutral fat constituted 11 to 35 per cent. of the total, an average of 24 per cent., the fatty acid from 65 to 89 per cent., an average of 75 per cent. Blood urea was found normal in two instances, as was also the carbon dioxide content.

Interest attaches to the tests for pancreatic ferments in the stools. Trypsin was absent in four cases and diminished in the fifth, but present in normal quantity in three. Amylose varied greatly. Tetany as a complication was observed in two cases. The author's experience leads him to doubt whether patients with well-developed psilosis ever recover. He is of the opinion that no sufferer from sprue should ever return to the tropics.

P. H. M-B.

BROWN (Thomas R.). **The Absence of Pancreatic Secretions in Sprue and the Employment of Pancreatic Extract in the Treatment of this Disease.**—*Amer. Jl. Med. Sciences.* 1921. Apr. Vol. 161. No. 4. pp. 501–507.

The author comments upon the absence in literature of any reference to microscopical appearances of the pancreas in sprue. [This statement is hardly correct.] He considers it a matter worthy of investigation, as he has had an opportunity of studying five cases, in all of which marked improvement took place after the administration of pancreatic extract, but the symptoms promptly reappeared when the extract was stopped. Quantitative estimations of the pancreatic ferments were made from stool analyses, and also from the duodenal contents abstracted by Einhorn's bucket. No pancreatic ferments—trypsin, lipase or diastase—were found.

Judging from pathological findings an enormous diminution of the intestinal ferments must take place in sprue, and the absence of trypsin, enterokinase, invertin and the duodenal hormones, and disturbances in the chemistry of the bile, all have an influence upon the secretion of pancreatic juice.

As regards gastric secretion the results were variable; one case showed hyperacidity, two subacidity and two hyperchlorydria.

The administration of large doses of pancreatin, or some form of pancreatic extract, 5–10 gr., with 20–40 gr. of calcium carbonate or calcium lactate, three times daily, was followed by rapid and remarkable improvement.

P. H. M-B.

CANTLIE (James). **Sys Powder and its Use in Sprue.** [Leader.]—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. pp. 244–246.

This leading article describes the treatment of sprue originally practised by an unqualified man—Peter Sys—in Shanghai. He withheld all food for 12 hours, and at the end of that period administered an ounce dose of castor oil. During the following 24 hours the patient was given a basin of chicken tea and one or two teaspoonfuls of a special powder supposed to be made of the ground internal shell of the cuttlefish. After cessation of the diarrhoea the patient was at once permitted to eat meat—by preference slightly underdone beefsteak. The original Sys powder can only be obtained in Shanghai, but a substitute has been put on the market under the name of Pulv. Batavia [a name originally bestowed by Sir Patrick MANSON]. The writer then repeats his well-known views as to the value of meat in the treatment of sprue.

P. H. M-B.

TROPICAL OPHTHALMOLOGY.

HOLLAND (B. T.). **Notes on 2,412 Eye Operations performed in a Month at Shikarpur, Sind, in Jany. and Feb., 1921.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 212–213.

These operations were performed within a period of 29 days, several general surgical operations, not included in the review, having been performed during the same period.

Most of the work of the hospital for the year appears to be condensed and carried out within two months. The hospital staff consists of three doctors, one assistant surgeon and two nurses, with a compounder, two dressers and two theatre assistants. The greatest number of operations performed on one day was 186; these included 112 operations for cataract. Subconjunctival injections of saline are included in the return as operations.

One thousand two hundred and three operations for cataract were performed, the intracapsular operation being done in 95 per cent. of cases. Nine cases of sepsis occurred and eight cases of choroidal haemorrhage. This rather high percentage of complications is easily accounted for by the conditions under which the work was carried on. Holland emphasizes the importance of entering the knife at an angle to the surface with a view to avoiding the danger of splitting the layers of the cornea. The inclination of the knife is altered once the point has entered the chamber.

Two hundred and ninety-six operations were performed for entropion and trichiasis; 253 iridectomies were done, most of these being for corneal leucoma.

Subconjunctival injections of cyanide of mercury have been practically abandoned in favour of saline injections, which are found less painful.

R. H. Elliot.

NEVILLE (W. S. Thacker). **A Year's Work in an Eye Clinic.**—*China Med. Jl.* 1921. Mar. & July. Vol. 35. Nos. 2 & 4. pp. 128–131 & 369–377.

One of the most striking features of the writer's experience at Mukden was the amount of trachoma encountered. This disease was responsible for nearly half of the 2,287 admissions to the clinic, and the great majority of the trachoma patients suffered from serious complications. Pterygium is another common condition, being met with in 106 patients. One case is recorded in which a double pterygium was present, a growth springing from each canthus, the apices almost meeting each other at the centre of the cornea. Neville advises that in such cases the apex should not be dissected off the cornea, but that the tip should be left to atrophy after division of the neck of the growth.

Thirty-five cases of dacryocystitis were treated, so that this disease appears to be very common in the district; its frequent occurrence is possibly connected with the prevalence of trachoma. Excision of the sac was the usual treatment for the disease, local anaesthesia being employed. Neville justly emphasizes the danger of injecting adrenalin into the tissues during the administration of chloroform.

The number of cases of glaucoma seen (38), compared with those of cataract (47), is very remarkable, and shows a striking difference from the experience of Indian clinics. Smith's intracapsular expression was the operation performed in the treatment of cataract. As might be expected, most of the glaucoma patients had reached a very advanced stage of the disease.

Only 25 cases of fundus disease presented themselves, and 10 of these were affections of the optic nerve (four neuritis and six atrophy). Three cases of disseminated choroiditis were seen, and one of retinitis pigmentosa. This contrasts with Indian experience, in which disseminated choroiditis is a very rare disease and retinitis pigmentosa a very common one.

R. H. E.

Li (T. M.). **Diseases of the Eye.**—*Nat. Med. Jl. China.* 1921. June. Vol. 7. No. 2. pp. 40–52.

In this paper Dr. Li deals with the leading anatomical features of the eye, and compresses into tabloid form a description of the chief characteristics of such diseases of the eye as the general practitioner is likely commonly to meet with in China.

R. H. E.

Chih (Pa Ta). **Bacteriological Examination of Smears from 1,004 Consecutive Eye Cases.**—*Nat. Med. Jl. China.* 1921. June. Vol. 7. No. 2. pp. 52–54.

This paper is a report of the beginning of a research to determine the aetiological factors in the external inflammatory disorders of the eye, met with in a routine dispensary practice in China. The organisms found, and their frequency, were as follows: Morax-Axenfeld in 166 cases; staphylococci in 97; pneumococci in 95; Koch-Weeks in 66; xerosis in 29; unclassified in 28; gonococci in 9; streptococci in 7. In 547 of the cases examined no organisms were discovered. Out of 361 cases of uncomplicated trachoma the examination was negative in 224 instances. No organisms were found in three out of four cases of dacryocystitis, whilst the staphylococcus was present in the fourth case. These facts show how essential it is to make a cultural examination before an opinion can be formed that the conjunctival sac is free from bacteria.

R. H. E.

Wilmer (A. J.). **Effects of Carbon Monoxide upon the Eye.**—*Amer. Jl. Ophthalm.* 1921. Feb. Vol. 4. No. 2. p. 73.

The increasing industrialism of parts of the Tropics lends considerable interest to this paper, which draws attention to the many sources of carbon monoxide production and to the evil effects of its inhalation in minute doses.

These sources are met with in such industries as deal with coal gas, producer gas, water gas and furnace gas; carbon monoxide is also obtained in considerable quantity from the exhaust of internal combustion engines.

Chronic poisoning is associated with general nervous symptoms, which, in some cases, may produce hallucinations and delusions. Children are more susceptible to its noxious influence than are adults. Poisoning by the gas may cause various disturbances of the functions of the eye; amongst these have been noted: paralysis of ocular muscles, hemianopsia, amblyopia, and optic neuritis. Wilmer noted a marked contraction of the visual field and the presence of a paracentral scotoma in one of his cases; the patient suffered from an optic neuritis.

R. H. E.

RATHERY (F.) & CAMBESSÉDÈS. **Amaurose quinique.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. July 21. No. 25. pp. 1142–1147. With 2 text figs.

The writers described the ocular changes which they observed in a case of quinine poisoning and discuss the condition.

The patient was a man, aged 41, who had contracted malaria whilst on military service in the East. He was in the habit of dosing himself with cachets, each of which contained 0·5 gm. of sulphate of quinine. Hoping to cut short an attack of fever, he took 18 of these cachets (a total of 9 gm. of quinine sulphate) between 8 a.m. and noon. Four hours after taking the last dose he developed vertigo and aural symptoms. After vomiting he went to sleep. That night, on waking about 12 o'clock, he found that he was completely blind. When brought to hospital he was found to have lost all vision and his pupils were observed to be greatly dilated; haemoglobinuria was present.

Two days after the drug had been taken some light-sense returned. An ophthalmoscopic examination was made on this date; the pupils were very widely dilated and quite inactive, the papillae were excessively blanched, and the arteries very small. Vision was slowly regained, and when it became possible to test the visual fields, these were found to be nearly concentrically contracted almost as far as the 10° circle. There was a very gradual improvement, both in the visual fields and in the acuity of sight, up to the time of the last note, made 38 days from the commencement.

When discussing the case, the writers conclude that the effects observed cannot be solely due to the vascular changes in the retina, but consider that a toxic influence is exerted on the retinal cells; these are possibly rendered more vulnerable by the effects of vasoconstriction.

The inhalation of amyl nitrite appeared to be beneficial in the treatment of the case.

R. H. E.

BLAKE (Eugene M.). **Ocular Changes in Infantile Scurvy.**—*Amer. Jl. Ophthalm.* 1921. Oct. Vol. 4. No. 10. p. 736.

This paper furnishes a short review of the aetiology and symptoms of infantile scurvy, with a description of some of the lesions found. Exophthalmos, due to haemorrhage into the orbit, is stated to be the most frequent and most striking ocular complication.

Blake describes a case of an infant who developed exophthalmos during the course of an illness diagnosed as "rheumatism." The right eye was markedly exophthalmic, but the motility was unimpaired. The eyeball was free from tenderness, and there were no haemorrhages into the lids or subconjunctival tissue. There were no pathological changes noticeable in the retina. The case rapidly improved once its nature was recognized and an appropriate treatment given.

R. H. E.

Roy (J. N.). **Des affections oculaires dans la syphilis et la trypanosomiase humaine chez les indigènes de l'Afrique.**—*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 4. pp. 103–119.

This paper records observations made in the course of an extensive tour in Africa. After discussing the original source of syphilitic infection amongst the natives of Africa, the writer concludes that the disease was imported from Asia, and that the inhabitants of the Red Sea littoral and the north coast of the continent were first affected, the disease being handed on to the negroes by them. Europeans were largely responsible for the introduction of syphilis into the southern parts of Africa.

The black races who were in touch with the Arabs, Moors and Egyptians, were infected by them with trachoma as well as syphilis. Contrary to the statements of some writers, trachoma was found to be very common amongst the blacks of Northern Africa; destructive types of the disease, too, were just as common amongst these as amongst the other races. Trachoma is very rare, however, south of the fifth degree of latitude N., and does not exist in the region of the central forests.

Roy thinks that some of the African tribes have developed a certain degree of immunity against syphilis, and that the disease runs a very mild course in them; he claims to have previously observed a similar immunity amongst Asiatics and the inhabitants of South America. Ocular complications of the disease are quite infrequent amongst negroes, and, when they occur, seldom attack the structures of the posterior segment of the eye; this is so even when the syphilitic infection is very severe. He says that syphilis seldom attacks the central nervous system of the negro, and that tabes is practically unknown among the blacks of Africa; this disease, according to him, appears to be peculiarly the property of the white races. Roy suggests that it is possible that writers, who have found the negro highly susceptible to the ocular complications of syphilis, have not confined their observations to those of pure blood.

Roy states that African natives do not appear to suffer much from lesions of the eye in the course of an attack of trypanosomiasis, but he does not distinguish between the various forms of infection; this is a very important omission. He examined 418 negroes, who were suffering from sleeping sickness, and found swelling of the optic nerves in four cases; two of these were in the last stages of the disease, and the oedema was probably caused by increased intracranial pressure. Nineteen cases of simple white atrophy of the nerves were found amongst these 418 patients; the atrophy was attributed to the injection of atoxyl or similar arsenical drug.

R. H. E.

Gupta (H. Das). **A Case of Filarial Cyst on the Eye.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. p. 338.

A male Mohammedan, aged 25, was seen a fortnight after the onset of severe pain in the eye. A small cystic tumour was found near the outer canthus. A gelatinous fluid escaped when the cyst was incised, and two fine white worms were found coiled together amongst the cyst contents. The worms were 1¼ in. in length, one being slightly longer than the other. Unfortunately they were not identified. [It is of great importance that all such specimens should be sent to some recognized authority for identification. They should be placed as soon as possible in 75 per cent. alcohol, to which 10 per cent. of glycerine has been added. Such material will always be welcomed by the Laboratories of the London School of Tropical Medicine, Endsleigh Gardens, N.W.1.]

R. H. E.

NICOLLE (Charles) & CUÉNOD (A.). **Étude expérimentale du trachome.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. July. Vol. 1. No. 2. pp. 149–178.

The writers begin this paper by reviewing the work previously done by them during their investigations as to the kind of animal suitable for inoculation, and their researches into the properties of the virus of trachoma.

The second part of the paper refers to their more recent work, and deals with the development and duration of trachoma in the Algerian baboon (*Macacus innuus*), the experimental inoculation of the disease in the rabbit, the conservation of activity by the virus for a period of 37 days after having been injected into the testicle of a rabbit, the protection afforded by an experimental attack of the disease, after it had been cured, against a second inoculation, and experiments to show the part played by flies in the spread of trachoma.

They conclude (1) that trachoma virus, when inoculated in the baboon, can be made to produce a disease which exactly resembles human trachoma, both in its clinical manifestations and in its complications; (2) that the rabbit is susceptible to a modified form of the disease; (3) that trachoma virus can maintain its activity after having been retained in the testicular tissue of the rabbit for a period of at least 37 days; (4) that, in the case of the baboon and the rabbit, a cured attack of experimental trachoma affords no protection against a second experimental attack of the disease; (5) that a contaminated fly is infectious for a period of at least twenty-four hours, even though the virus may have been exposed to the ordinary atmospheric conditions —*e.g.*, on the surface of a rag—for a period of six hours before the insect settled upon it.

The authors lay some emphasis on the part played by flies in the propagation of trachoma, and they recommend that systematic fly destruction should be undertaken in hospitals where trachomatous patients are treated, and that the wards should be rendered fly-proof.

M. sinicus, *M. cynomolgus*, and *M, rhesus* were all found to be resistant to trachoma, but the Algerian baboon was found to be very satisfactory for experimental purposes.

Regarding the nature of the virus, they are of opinion that it is an invisible micro-organism, which can pass through a Berkefeld V filter; they consider that the bodies described by PROWAZEK and HALBERSTAEDTER are certainly constant in trachoma, but that their signification is doubtful and their specificity awaits proof. The virus is destroyed if it is kept at a temperature of 50° for half an hour.

The interesting suggestion is made that different infections may be confounded under the common term trachoma; such infections are due to invisible micro-organisms, indistinguishable from one another; these excite entirely similar reactions in the conjunctiva, causing the formation of granulations and leading to complications of similar type.

R. H. E.

KIRKPATRICK (H.). **Some Points concerning Trachoma.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 & May 20. Vol. 15. Nos. 1 & 2. pp. 35–51. With 9 text figs. (Discussion, pp. 52–53.)

The causation of trachoma is first taken up, and then in turn the pathology, the signs and symptoms, the diagnosis, and the treatment are discussed. One of the most important features of the paper is the reference to the large number of probably widely different conditions, which, at the present time, we include under the convenient term "trachoma." Kirkpatrick's method of ballooning the conjunctiva by means of a subconjunctival injection of fluid will be found to be a most efficient means of ensuring the complete exposure of the membrane for the local application of drugs, or for various minor surgical proceedings. Another original suggestion, and one which is warmly commended by those who have tried it, is the use of eye-baths of a saturated solution of magnesium sulphate. These are indicated in gonococcal and streptococcal infections. The whole paper is worthy of very careful study, and must be read in the original to be properly appreciated.

R. H. E.

HARFORD (Charles F.). **Trachoma among the Chinese in France.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 & May 20. Vol. 15. Nos. 1 & 2. pp. 54–56.

In this paper Harford records his observations on the conjunctival conditions found in Native Labour Corps, made in the course of his service in France. The disease, seen amongst the Chinese coolies in the trachoma company, resembled the bad cases of muco-purulent conjunctivitis which occur in England, with the addition of some nodular elevations under the red, velvety conjunctiva. He has never heard of any case of trachoma arising in France among South African natives.

He is strongly of opinion (*a*) that the term trachoma is too loosely applied to cases of conjunctivitis in subtropical climates; (*b*) that the whole subject calls for the earnest attention of ophthalmologists and of all practitioners in these countries; and (*c*) that the governments concerned should make it the subject of searching enquiry.

R. H. E.

MICHAIL (D.). **Recherches sur la pathogénie des récidives du trachome.**—*C. R. Soc. Biol.* 1921. May. Vol. 84. No. 19. p. 1036.

This short paper represents an extension of Michail's theory that the primary infection in trachoma attacks the lachrymal gland, and that the conjunctival changes, characteristic of the disease, are secondary to this infection. He states that relapses mostly commence at the outer angle of the upper fornix (in the region of the lachrymal gland), and that they are due to a chronic infection of the gland.

R. H. E.

KAZUO (Hiwatari). **The Diagnosis of Trachoma Granules upon the Limbus of the Cornea.**—*Amer. Jl. Ophthalm.* 1921. Mar. Vol. 4. No. 3. pp.

Kazuo states that every prominent ophthalmologist in Japan is agreed that the development of trachoma follicles, in the tissue affected by pannus, is a very rare event in that country. He points out the difficulties in diagnosis, and suggests that, in some cases, the follicles may be drawn on to the limbus from other regions by the contraction of the trachomatous conjunctiva. He states that it is often difficult to distinguish small focal areas of inflammation on the limbus, due to secondary infections, from trachomatous follicles.

R. H. E.

STAICOVICI (N.) & LOBEL (A.). **Enseignements recueillis au cours de la guerre sur 12,000 granuleux.**—*Arch. d'Ophthalm.* 1920. Nov. Vol. 37. No. 11. pp. 689–699.

The writers had an experience of some 12,000 cases of the disease. They recommend prolonged grattage with a cube of sugar, sterilized in alcohol, as having given them satisfactory results. The conjunctiva is first disinfected and is then anaesthetized by the instillation and the subtarsal injection of cocaine. The lid is thoroughly everted and held stretched in position on a hard rubber plate by a double hook, which is inserted close to the lid margin. The conjunctiva is then lightly rubbed with a cube of sugar, which had been previously sterilized by dipping it in alcohol, until a smooth, milky looking surface comes into view. The treatment is applied to the conjunctiva of the lower lid and that of the canthi, as well as to that of the upper lid and fornix. Great care should be taken not to injure that part of the retrotarsal fold which is free from disease. The false membrane, which forms after the treatment, is usually shed in about five days.

Oxycyanide of mercury in a 1 in 5,000 solution, protargol, 2 per cent. solution of silver nitrate and copper sulphate are used during the after-treatment. The authors also recommend massage of the conjunctiva with an ointment containing 30 per cent. of copper sulphate.

Subconjunctival injections of ½ cc. of 10 per cent. solution of dionine [ethyl-morphine] combined with ½ cc. of 1 in 3,000 cyanide of mercury are advised for the treatment of trachomatous ulceration of the cornea. Three injections, made at three-day intervals, were usually found sufficient.

Peritomy was employed for vascularized pannus, the bare area, left after the division of the conjunctiva, being rubbed with the sugar cube.

R. H. E.

RUSH (Calvin C.). **Treatment of Trachoma.**—*China Med. Jl.* 1921. May. Vol. 35. No. 3. pp. 211–213.

Rush, in this paper, describes the methods of treatment that he has found of value. He recognizes the difficulty of diagnosing folliculosis from the early stages of trachoma, and states that follicles may be found in the outer part of the retrotarsal folds of the majority of the Chinese residents in Canton. He suggests that the action of the sun may be a possible cause of this folliculosis. [If this were correct one would expect to find the same condition amongst natives of India and other countries where the eyes are exposed to powerful glare. It would, therefore, appear likely that, though glare may be a contributing cause of the condition, other factors must be present. A constitutional predisposition and a tendency to infection, would have to be taken into account.]

Rush has found beneficial results to follow the judicious use of copper sulphate and the subsequent application of glycerite of boroglycerin. The glycerite is applied after cocainization, and, when the upper lid is involved, it is rubbed into the conjunctiva with pressure. Copper sulphate has been found especially useful when pannus was present. This treatment is alternated with that by the glycerite. Nitrate of silver and other drugs have also been used as applications.

R. H. E.

DIMITRY (T. J.). **The Tarsus made Pliable as a Cure for Trachoma.**—*Amer. Jl. Ophthalm.* 1921. Feb. Vol. 4. No. 2. p. 107.

The object of the writer is to cause an absorption of the infiltration which occurs in the deeper tissues in the course of trachoma, and at the same time to expel the contents of the trachoma follicles without giving rise to cicatrization or injuring the normal tissues.

Dimitry utilizes a heavy piece of copper wire, of the size used for street car cables. The rod is about eight inches long, and is bent slightly about two inches from its end; a thin layer of cotton wool is evenly twisted round this bent portion. The lid is everted, and, after moistening the wool with sterile water, the end of the rod is passed into the fornix beneath the everted tarsus. The tarsus is now compressed between the wool-covered rod and the thumb used to maintain eversion of the lid. The rod is, at the same time, rotated, so as to cause the tarsus to bend and to cause expression of the follicular contents. Repeated manipulations are made until all the follicles have been emptied. As a result of this procedure, the indurated tarsus becomes pliable and can be easily manipulated. If a general anaesthetic is employed only one sitting is required, whereas repeated treatments may be necessary if local anaesthesia is used. Dimitry points out the importance of eliminating any secondary infection as a preliminary measure and of maintaining a rigid asepsis during the whole proceeding.

R. H. E.

FLECK (Harvey K.). **Disciform Keratitis Secondary to Smallpox.**—*Amer. Jl. Ophthalm.* 1921. Aug. Vol. 4. No. 8. pp. 573–579.

Fleck records the case of a patient who, ten days before the appearance of a smallpox eruption, had a foreign body removed from her cornea, and during the course of the disease developed a spot of corneal inflammation, which resembled disciform keratitis, at the site of the injury. When the patient was first seen the eruption was in the papular stage and signs of the injury were just visible; twenty-one days later, when seen again, the patch of keratitis had developed.

The literature of the subject is reviewed, and the differential diagnosis is discussed. FINDLAY's observation is quoted that the usual time for the appearance of this complication is between the end of the second week and the end of the third week of the disease.

Fleck expresses the opinion that the corneal changes, that at times occur during the progress of a case of smallpox, are the result of a secondary infection, and that the corneal reaction is less severe because of the previous systematic reaction to the same toxin. He concludes that the indications are that disciform keratitis secondary to smallpox is a specific inflammation, probably as specific as the pustule itself.

R. H. E.

MACRAE (Alex.). **Nodular Keratitis of South Arabia.**—*Brit. Med. Jl.* 1921. Nov. 5. pp. 739–740.

Macrae describes a peculiar affection of the cornea which he has met with amongst the natives of South Arabia. The disease is chiefly seen amongst seamen and those dwelling near the sea coast. Males and those of middle age are most often affected. The condition causes a dimness of vision, which is most apparent during the daytime, when the light is bright and the pupil is small. Both eyes are commonly attacked. The corneal changes are unaccompanied by any vascular reaction of the tissue or of the conjunctiva, nor does iritis occur. A little group of glassy nodules of various sizes, the largest having a diameter of about 1 mm. and projecting about the same distance from the surface of the cornea, is seen to occupy an area in or below the equatorial corneal meridian. Examined by focal illumination, they resemble a group of round-topped mountains on a raised map. The nodules are not always transparent, and some or all may be slightly white and opaque. The cornea between and around the spots may not be clear, but may show leucomatous change, or may even stain in parts with fluorescin.

The disease cannot be ascribed to any definite cause, but it is suggested that it may be the result of microscopic grains of salt or sand having been embedded in the superficial layers of the cornea. [This explanation is not easy of acceptance.]

R. H. E.

WRIGHT (Robt. E.). **Blocking of the Facial Nerve in Cataract Operations.**—*Amer. Jl. Ophthal.* 1921. June. Vol. 4. No. 6. p. 445.

Wright has used this method of causing a relaxation of the orbicularis muscle in one hundred patients, who appeared likely to squeeze their eye violently during an operation for cataract.

An injection of 2 per cent. novocaine was made into the orbicularis five minutes before the patient was brought into the theatre. The needle was entered over the centre of the zygoma, and, following the line of the latter, was pushed to the pinna. The injection was made during the withdrawal of the needle. The needle was then turned and pushed in the opposite direction, but in the same line, to a point approximately below the centre of the eye, the injection being made on withdrawal as before.

This treatment was effective in all the cases, with one exception. No bad effects whatever could be attributed to the injection, but a warning is given to keep the infiltration away from the lids.

Wright draws attention to the description of similar methods by Van LINT and VILLARD, and supports the principle advocated by them.

R. H. E.

GREEN (A. S.) & PACHECO (Luna R.). **The Barraquer Intracapsular Operation.**—*Amer. Jl. Ophthalm.* 1921. Aug. Vol. 4. No. 8. p. 595.

The paper records impressions gained from a visit to Professor BARRAQUER's clinic at Barcelona. They note that BARRAQUER attaches a great deal of importance to the vibrations transmitted by his instrument to the zonule, as he claims that they rupture the fibres of the zonule, and thus permit the extraction of the lens with the least possible traction upon the ciliary body. In private practice BARRAQUER is reported to operate upon patients in his office and to allow them to go home immediately afterwards. The writers were very favourably impressed by the operation, and conclude that, with slight modifications it will probably become the operation of the future. They issue a warning, however, that it is no operation for an amateur to undertake, since, in the first place, a proper instrument is essential, and, in the second place, the highly developed skill and technique that is required in all cataract operations, is even more necessary in this.

R. H. E.

MAYNARD (F. P.). **Glaucoma and Epidemic Dropsy.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. pp. 281–282.

This paper is an addition to Maynard's previous note upon the subject, and in it he records 104 cases of glaucoma that occurred in patients who were suffering from epidemic dropsy, and which were apparently connected with the general disease.

Eighty of the cases occurred in males and 24 in females. The age of those affected was strikingly young, the average being under 35 years; only 19 patients were above 45 years. The blood pressure, taken in 35 cases, was found to be decidedly raised; 73 patients complained of coloured haloes round lights. Of the classical signs of glaucoma, shallowness of the anterior chamber, dilatation of the pupil and ciliary injection were infrequent; moderate increase of tension, steamy cornea, contraction of the field of vision, and pathological cupping were the main symptoms met with, and these left no doubt as to the glaucomatous nature of the disease.

Trephining was found to be the most satisfactory form of treatment.

R. H. E.

UBALDO (A. R.). **Clinical Forms of Panophthalmitis observed in the Philippine General Hospital.**—*Philippine Jl. Sci.* 1920. July. Vol. 17. No. 1. pp. 65–69.

Ubaldo furnishes statistics of 70 consecutive cases of panophthalmitis in the Philippines. He divides his cases thus: Infections from corneal ulcers, resulting from injury by rice stalks, grass, hemp, and the sharp edges of leaves, 15.

Infections from trauma, the result of injury by nails, bamboo sticks, finger-nails, cinders, dust and other foreign bodies, 10.

Infections from inflammation of old lesions, predisposed to by undue exposure of the eyes (staphylomata, facial paralyses, exophthalmic goitre, etc.); 10.

Endogenous infections, 35.

He discusses the rival merits of enucleation and evisceration, and thinks that the former should be reserved for the earlier cases, and the latter for the later more septic ones.

[With reference to his good fortune in so far escaping a fatal result after enucleation, the reviewer would sound a note of warning to the young surgeon in the Tropics. Whatever may be the verdict of Western practice, he is satisfied that it is dangerous to enucleate as a routine measure in the violent septic cases so commonly met with in tropical practice; and he would venture to predict that no surgeon who does a large number of enucleations for panophthalmitis, will indefinitely escape a fatal accident. With regard to his comment on DE SCHWEINITZ' case, in which uveal tissue had been left behind, it is hardly necessary to emphasize the very great importance of removing every scrap of this tissue in an evisceration and of thoroughly sterilizing the cavity left with a powerful antiseptic, such as tincture of iodine or 1 in 200 biniodide of mercury solution.]

R. H. E.

DENGUE AND UNCLASSED FEVERS.

COUVY (L.). **Dengue: Constatation de spirochètes dans le sang.** —*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. p. 198.

The author notes that in an epidemic of dengue in Beyrouth, Syria, which attacked practically the whole population, direct examination of the blood showed the presence of short slender spirochaetes having two or three turns and fine extremities. These were only present when the blood was taken two or three hours *before* the onset of the fever; never during the course of the pyrexia or after the temperature had fallen.

[It is not stated whether the organisms were detected by dark-ground illumination in fresh blood or in stained specimens. CRAIG has suggested, from the analogy with yellow fever, that spirochaetes might be cultured by NOGUCHI's method.]

P. W. Bassett-Smith.

COUVY. **Etiologie de la fièvre à phlébotomes.**—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 447–448.

In a letter dated June, 1921, the author reported that he had found spirochaetes in the blood three hours and twenty-four hours after the onset. He here describes more particularly the clinical characters of the fever, the most important points being the severe onset, the pharyngeal exanthem, the two or three-day fever followed by slight relapse on the seventh day, and often a repetition of the symptoms in a mild form during the fifth week. The asthenia was very marked and often prolonged. The incubation period was at least five days, and cases at the commencement of an epidemic were less severe than those at the end.

P. W. B-S.

CLAPIER. **Endémicité, sur l'Oubangui, de fièvres rappelant la dengue.** —*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 94–107. With 4 text figs.

At Oubangui, in French Equatorial Africa, a number of cases of so-called climatic fevers of doubtful origin are met with, having clinical resemblances to dengue, seven-day fever, and sand-fly fever; the mild cases closely correspond with the *fevrier asthenomyalgic* of N. BERNARD.

The author gives the clinical notes of ten cases and discusses the etiology. The eruption is very like that of measles, is generalized, and spreads from above downwards, lasting two or three days; the pains are well marked, and adults are most affected. Though endemic, the disease can hardly be called epidemic; most of the whites contract it, but it is also present among the natives. The fever lasts a short time—three to six days—the saddle-back type is found, and it is followed by asthenia for some time after convalescence. The author, who suffered from the fever himself, concludes that it resembles most the slight forms of dengue. The carrier is uncertain, *Phlebotomus rondani* is found in Oubangui, but *Culex* and *Stegomyia* exist in more or less large numbers.

P. W. B-S.

CORSON (J. F.). **A Case of Fever resembling Dengue occurring at Accra, Gold Coast. Notes of some other Similar Cases.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 1. Vol. 24. No. 19. pp. 253–254. With 1 text fig.

The occurrence of dengue-like cases on the Gold Coast is not infrequent, and the author's description of his cases is interesting. In these the pyrexia appeared to have been fairly severe and the rash very marked. No causal agent was observed and no epidemiological notes are given.

P. W. B-S.

DAVIES (L. Wynne) & JOHNSON (W. B.). **Notes upon the Occurrence of a Twelve-Day Fever of Dengue Group in Nigeria.**—*Jl. Trop. Med. & Hyg.* 1921. July 15. Vol. 24. No. 14. pp. 189–192. With 8 charts in text.

The cases occurred in the months of July to October, 1920, in the Northern Province of Nigeria. Notes of 15 Europeans and 3 natives were taken. The cases were scattered, and did not appear to be infectious. The illness was severe, and convalescence was protracted, but there were no deaths. The incidence of cases corresponded roughly with the rainy season, and pointed to a mosquito as the infecting agent, probably one of the *Culex* group. The temperature charts do not show the saddle-back type of dengue, and arthritic swellings were not noticed. It is noted that similar cases have occurred sporadically in Nigeria during the past few years.

P. W. B-S.

MEGAW (J. W. D.). **A Note on the Twelve-Day Fever of Nigeria.**—*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 371–373.

The author gives a critical summary of DAVIES & JOHNSON's paper. He was struck by the resemblance of this fever to that of the Kumaon fever of India, and considers that it was not a form of dengue, for the following reasons:—The duration was too long, the temperature chart showed no evidence of primary and secondary waves, the onset and termination were less rapid, the rash was very unlike and too persistent, and there was no definite leucopenia; also there were no epidemics. He suggests that the Nigerian cases should be placed among the typhus-like group of fevers. As the epidemiological facts were against louse infection, and rather in favour of ticks as " carriers," the reasonableness of this view is increased, though the possibility of transmission by other arthropods, such as mites, must be remembered.

Further investigation in Nigeria on these lines is therefore required to clear up the etiology of the disease.

P. W. B-S.

MEGAW (J. W. D.). **A Typhus-like Fever in India, possibly transmitted by Ticks.**—*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 361–371. With 7 charts in text.

In this interesting article the author describes fully and discusses very ably the characters of a peculiar fever found in the Himalayan regions of India, particularly at Bhim Tal and Sal Tal, 4,500 feet up in the Kumaon division, and he compares this with other typhus-like fevers which have been reported from various geographical areas widely separated. He first gives an abridged report of an unpublished paper by Col. McKechnie on the fevers observed by him in 1913 in the same Indian area, which in the end he was reluctantly convinced were forms of typhus and not paratyphoid. The author then describes cases observed by himself, Sprawson, Hardy, and others, including his own illness [see this *Bulletin*, Vol. 9, p. 489], and brings forward strong arguments to show that the Kumaon fever has a close relationship with Rocky Mountain fever and is probably conveyed by ticks, of which there was good evidence in his own case and much probability in others. The disease was but little infective, whites were frequently attacked, the virulence was slight; but the fever generally lasted about twelve days, and the rash was very marked. It is most often mistaken for some form of paratyphoid, but in recorded experiments the specific agglutinins have been very low or absent for these organisms. The author gives the following useful provisional classification.

TYPHUS GROUP.

Louse Typhus.	Tick Typhus.	Mite Typhus.
A louse-borne disease of filth, crowding, poverty :—	A disease of open-air life in the wilds :—	A disease of recently flooded places :—
A. Severe typhus (mortality high).	A. Rocky Mountain fever :— (1) Montana type (high mortality —60 per cent.). (2) Idaho type (low mortality —18 per cent.).	A. Tsutsugamushi (high mortality—up to 55 per cent.).
B. Mild typhus or Brill's disease (mortality low).	B. (?) Tick typhus of Kumaon and other places in India (low mortality—about 5 to 10 per cent.).	B. Sumatra tick typhus (low mortality).
C. Tabardillo or Mexican typhus.		

Prophylaxis depends on the determination of the "carrier" that spreads the disease. If the theory be true that it is a disease affecting animals of the jungle, communicated by ticks, like Rocky Mountain fever, then further research work on these lines is urgently required and precautions against tick bite infection are worth carrying out, with the extermination of the mammalian host, which method has been found so successful in the Rocky Mountains.

The paper should be carefully read by all interested in the subject.

P. W. B-S.

Coppin (H.). **Sur une fièvre épidémique du Tonkin rappelant le typhus exanthématique.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1921. July. Vol. 12. No. 1. pp. 66-82. With 4 charts.

The author gives his experiences of a number of cases of a peculiar fever treated at the special hospital of Ching-Vong between February and June, 1921. The great majority came from the prison of Hanoi.

There were altogether 108 cases, seven of which were males, with 18 deaths, or 16 per cent. The fever was provisionally diagnosed as influenza, but later was considered to be typhus of an irregular type. The clinical characters are very well described, and the difficulties of diagnosis are pointed out. The absence of efficient laboratories, negativing investigation by Weil-Felix and appropriate animal tests, is deplored. The congestion of the eyes, prostration, character of the fever, nervous symptoms and eruption (found in 16 cases, seven of which were fatal) suggested that the epidemic in Tonkin was a form of typhus similar to that of Nhatrang in 1908, described by YERSIN. The patients had changed their clothing twice before they reached the hospital, so that it cannot definitely be stated that they were free from lice originally.

P. W. B-S.

WATSON (O. P.). **A Note on Four Cases of Infection with** *Bacillus faecalis alkaligenes.*—*Jl. Roy. Army Med. Corps.* 1921. Aug. Vol. 37. No. 2. pp. 143–145.

In these four cases of fever, although *B. faecalis alkaligenes* was isolated from the blood, the author gives reasons for believing that it was not the true cause of the fever, the chief being that in all the cases, the serum of the affected gave only a low agglutination titre to the organism and a much higher one to others of the typhoid group. This view is strengthened by the fact that the control sera of men in the depot, convalescent from established enteric diseases, generally gave a like reaction, and that in one of the four cases *B. typhosus* was isolated from the faeces and the man was evidently a "carrier." Possibly *B. faecalis alkaligenes*, already present in the intestine, is stimulated to increased activity by the presence of other organisms of the enteric group, as is known to happen with *B. coli communis*, and so gains admission into the blood stream.

P. W. B-S.

BERNARD (P. Noël). **Sur un microbe pathogène isolé au cours d'une fièvre de cause inconnue en Cochinchine (étude clinique et expérimentale).**—*Ann. Inst. Pasteur.* 1921. July. Vol. 35. No. 7. pp. 450–486. With 7 text figs.

From the blood of 92 cases of the climatic fever found in Indo-China, variously described as pseudo-dengue, five-day, and seven-day fever, a spore-bearing organism was isolated, the characters of which are here fully given. It was not pathogenic in itself, but appeared to be associated with an unknown germ; that is to say, it was a saprophytic microbe capable of activity in various pathogenic states. It produced in young pigs an infectious disease transmissible by the faeces; the course might be benign, or severe with marked nervous and gastro-intestinal symptoms. It has not yet been definitely ascertained whether the organism is distinctive of any single clinical disease, or even whether it has a specific action. The bacillus is called *B. asthenogenes*, it is very pleomorphic, is flagellate like *B. typhosus*, forms oval, central spores very rapidly, stains by Gram, is easily cultivated, haemolyses red cells, is killed with difficulty (120° C.), and produces a toxin active against pigs, rabbits and mice. It has many of the characters, cultural and bio-chemical, of *B. megatherium* (de Barry). The organism was isolated 92 times out of 212 blood cultures examined in the Institut Pasteur at Saigon, 31 times in Europeans and 61 in natives. The bacillus was also found in the viscera and urine of two fatal cases. The same organism was very commonly recovered from rice. The conditions produced in young pigs, rabbits and mice are very fully described; in the former it gave rise to symptoms similar to those in man. A preliminary report of the disease has already been given, but much further work is required to establish the etiological importance of the organism.

P. W. B.-S.

LOUGHNAN (W. F. M.). **Pyrexia of Uncertain Origin in Jamaica.**—*Jl. Roy. Army Med. Corps.* 1921. May. Vol. 36. No. 5. pp. 383–387. With 3 charts.

Cases of mild pyrexia of short duration are frequent in Jamaica; these are generally classed as P.U.O. They often occur in little epidemics in the hot weather, but are found in any month; clinically they are similar in many cases to the local fevers of Bombay; others are like phlebotomous fever. No cause was ascertained, and phlebotomous flies were said not to be present. Fresh arrivals are very susceptible to the disease, and the incidence of cases is greatest at sea-level and in the neighbourhood of any arid sandy soil, as at Port Royal.

P. W. B-S.

MCDONALD (W. M.). **Some Aspects of Differential Diagnosis in Tropical Fevers.**—*Jl. Trop. Med. & Hyg.* 1921. June 1. Vol. 24. No. 11. pp. 153–155.

The author, working at St. John's, Antigua, points out how difficult at times the diagnosis of tropical fevers may be, and that even malaria may in practice show few of the cardinal signs and symptoms of text-books. He emphasizes two facts from his own experience, namely, that a practitioner in the tropics is handicapped almost always by the fact that patients, when they seek advice, have generally taken much quinine and so have cleared the peripheral blood of parasites, and, secondly, that in subtertian malaria parasites are particularly few or difficult to detect. He cites malaria, filaria, typhoid, paratyphoid, worms, pulmonary tuberculosis and influenza as being the most common causes of fever, and appends a table which gives the "pointers" for differential diagnosis shown by examination of the peripheral blood.

TABLE.

1. Absence of eosinophiles, combined with leucopenia and a high Arneth index	Typhoid, paratyphoid.
2. Increase of large lymphocytes. Decrease of small lymphocytes and polynuclears. Eosinophiles normal. Anisocytosis and "brassy" cells. Arneth index normal or low	Malaria.
3. Polynuclear leucocytosis, 80 per cent. or over.	Septicaemia, abscess, pneumonia, meningitis.
4. Moderate increase of polynuclears and eosinophiles. No anisocytosis	Filariasis.
5. Approximately normal. Blood picture with high Arneth index	Pulmonary tuberculosis.
6. Marked eosinophilia	Ankylostomiasis and other worm infections.

P. W. B-S.

JAPANESE RIVER FEVER.

HAYASHI (Naosuke). **Etiology of Tsutsugamushi Disease.**—*Jl. Parasit.* 1920. Dec. Vol. 7. No. 2. pp. 53–68. With 3 coloured plates.

This disease has been proved to be conveyed by a minute red mite (*Leptus akamushi*, Brumpt) an ectoparasite of field mice which freely attacks human beings in the endemic area. The author has previously [see this *Bulletin*, Vol. 15, p. 25] described minute rod-like granules in the blood and cells of the infected. In this paper he gives details of his very thorough work on the life-history and morphology of the parasite, which appears to pass through a vegetative and generative cycle in the red blood cells and endothelial cells very similar to that described by WOLBACH for the parasite of Rocky Mountain fever. It differs from that of African cattle fever in the fact that both forms of development can take place in man, and the interposition of a secondary host or carrier is not always necessary, though general under natural conditions. Histological studies and animal experiments have been made with much patience for many years, so that the author speaks with authority. He has provided three very beautiful plates showing the various stages of the parasite, as seen when stained with Giemsa (Prowazek's trachoma granule stain); this brings out the chromatin substance and the characters of the parasite most clearly.

Summary.

1. Minute bodies, described as "rod," "spheroid," and "ring-shaped," have been found in the lymphocytes of lymph nodes and in mononuclear endothelial phagocytes of the spleen and lymph nodes, and in the region of the bite in patients suffering from Tsutsugamushi disease. They also occur free in the blood plasma, and in severe cases in the red cells.
2. The disease has been transmitted experimentally to monkeys, guinea-pigs, rabbits, and calves. Bodies similar in appearance and distribution to those found in human cases, have been demonstrated in experimentally infected animals.
3. These bodies, on account of the difficulty of differentiating their cytoplasmic and chromatic elements, resemble bacteria, but no evidence of their bacterial nature has been obtained from cultural or animal experiments.
4. Cultural experiments have proved wholly negative.
5. Microscopically, these bodies are found to possess definite morphology, with parts comparable to the nucleus and cytoplasm of a cell. Moreover, the three principal types in which they appear (rod, spheroid, and ring shapes), merge into each other. From these facts, it is concluded that the organism in question is a protozoon. Bodies of different sizes represent different stages in its life-cycle.
6. Biologically, this protozoon is to be considered as a new species, resembling but showing differences from *Bartonella bacilliformis* and *Theileria parva*. The parasite to which it appears most closely allied is *Theileria parva*.
7. The organism found in Tsutsugamushi disease, I have designated tentatively as *Theileria tsutsugamushi*, spec. nov.

P. W. Basset-Smith.

KAWAMURA (Rinya), HATTORI (Teikichi) & YAMAGUCHI (Shōdō). [**Preventive Treatment of Tsutsugamushi Disease.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. Apr. 10. No. 2172. pp. 707–712.

Inunction of mercury, the internal use of potassium iodide, or injection of tuberculin do not succeed in preventing the attacks of Tsutsugamushi disease. Immediate removal of the part bitten by the

Trombidium has many difficulties in practice. The present authors tried both to destroy the mites from the affected soil and to defend the body from their attack. Among numerous drugs experimented with, both neozol and cresol-soap solution are effective, but petrol emulsion is the least expensive and quite effective in killing the mites. If 100 per cent. solution of the latter is sprinkled on the soil so as to penetrate three to four inches deep it will kill all imagines and nymphs of Trombidium. On the other hand, spraying of 100 per cent. solution of neozol or desinfectol upon the body and clothes is very simple and successful. The authors applied the above method to the labourers engaged in riparian work in an affected district. The soil was treated for 59 days, and among the labourers, numbering 89·1 per day on an average and treated for 44 days, not a single case of the disease has been found.

Hiroshi Ohshima.

BERIBERI.

i. Eijkman (C.). **Zilvervliesrijst of aan vitaminen rijke bijvoeding?** [Unpolished Rice or Accessory Food Rich in Vitamins?]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1920. Vol. 60. No. 4. pp. 489–493.

ii. Schüffner (W.). **Zilvervliesrijst of aan vitaminen rijke bijvoeding?** [Same title.]—*Ibid.* No. 5. pp. 779–788.

iii. Salm (A. J.). **Nog eens over beri-beri en de voeding.** [Further about Beri-beri and Food.]—*Ibid.* 1921. Vol. 61. No. 1. pp. 97–108.

iv. Kuenen (W. A.). **Opmerkingen naar aanleiding van de beschouwingen van Dr. A. J. Salm over beri-beri en voeding.** [Remarks relative to the Views of Dr. A. J. Salm on Beri-beri and Food.]—*Ibid.* pp. 109–117.

v. Horst (M. D.). **Is verstrekking van zilvervliesrijst aan indische militairen mogelijk en noodzakelijk?** [Is it Possible and Necessary to supply Unpolished Rice to (Dutch East) Indian Soldiers?]—*Ibid.* No. 2. pp. 119–122.

In October, 1918, the issue of unpolished rice to the army in the Dutch East Indies, which had been introduced a few years before to combat beriberi, was stopped on account of the apparent aversion of the native soldiers to this ration, which was, in their opinion, an inferior food. Since then the soldiers have received polished rice, and besides that (partly in substitute) articles of food richer in vitamins.

This has induced some well-known authorities on the subject in the Dutch East Indies to take cognizance of this policy.

i. Eijkman points out that the Javanese, above all, wants to eat his fill with rice, and will not get accustomed to European food (bread, potatoes, vegetables) in any large quantities. Past experience in the native naval force (1874) has clearly shown this. Everywhere the difficulty is recognized of supplying a sufficient quantity of vitamins in a palatable form to a rice-eating population if only polished rice is available. On the other hand the withdrawal of such accessory articles of food does not cause any harm if only unpolished rice is supplied (according to the experience of Schüffner and Kuenen among the Chinese coolies of the Senembah Tobacco Company on Sumatra's east coast. *Arch. f. Schiffs- u. Tropenhygiene*, 1912. Vol. 16. p. 292). With the unpolished rice the consumer gets at the same time the necessary amount of vitamins to protect him against deficiency disease, whilst this protection is left to his own taste and goodwill when the main food consists of polished rice.

ii. Schüffner supports Eijkman's opinion. White polished rice ranks higher in the estimation of all classes than the unpolished sort. Schüffner is of the opinion that reform in this respect should commence among the higher classes, and admits that such cannot be expected from the native soldier, though he quotes a striking exception concerning Banka, where the Chinese coolies have been thoroughly convinced of the superiority of unpolished rice as a foodstuff. Schüffner relates how the native labourer of Sumatra's east coast could practically be kept free of beriberi by using market rice from Rangoon, containing 0·4 per cent. and 0·45 per cent. P_2O_5 of the dry substance (0·9 per cent. in the whole grain), which still suffers a loss by washing, etc., the meal, when prepared, containing about 0·3–0·35 per cent. P_2O_5. By the use of this rice, however, the population was continually kept on the verge of beriberi, which disease appeared here and there from time to time under the influence of special circumstances. During the war the planters had to take any sort of rice, including the polished brands, and beriberi occurred again in severe epidemics. In 1918 the rice stock became so scarce that its supply to the coolies had to be partly replaced by maize, sweet potatoes, etc., by which measure beriberi temporarily disappeared (as on no previous occasion). It appears that a certain degree of polishing of the rice can be allowed for, if care be taken that it is not accompanied by a loss of pericarp leaving less than a quantity corresponding to 0·45 per cent. P_2O_5. The appearance of this rice is considerably improved in comparison with the unpolished sorts, and is likely to be taken by the native soldier without any objection.

iii. Salm quotes two epidemics of beriberi occurring in prisons in the district of Kediri (Java). At Trenggalek an epidemic occurred in December, 1918, when only maize was supplied to the prisoners, whereas under the same feeding no beriberi was reported from other prisons in the district. The procuring of unpolished rice put an end to this epidemic.

At the principal town, Kediri, the prison dietary contained equal parts of rice and maize; the rice was of a bad quality, and a supply of fresh unpolished rice stopped the epidemic. Both epidemics were of little consequence.

Salm concludes that as beriberi occurred in only two of the prisons, and that in each only a small number of cases was reported, therefore besides the deficiency there must be another factor to cause an outbreak of this disease. He thinks that further study is necessary to clear up the beriberi problem; he also emphasizes the difficulties met with in issuing unpolished rice to the soldiers, which he considers only to be necessary if special danger of an outbreak of beriberi exists.

iv. Kuenen points out that Salm neglects the incubation period of beriberi. The bad rice supplied at Trenggalek before December, 1918, was probably the cause of the beriberi, not a supposed deficiency of the dietary at the time of the outbreak of the epidemic. Only a part of the prisoners contracted beriberi; the higher the degree of metabolism, the sooner deficiency becomes apparent—this may explain the fact that Salm's cases occurred only in well-nourished prisoners. There is no reason to accept the existence of other important factors besides the deficiency in diet to explain the outbreaks of beriberi. In the army the procuring of polished rice would mean a shortening of the incubation period of beriberi if special danger of an outbreak of this disease should arise (for instance, by want of accessory food articles and a higher degree of bodily exertion during expeditions, etc.).

v. Horst pleads the necessity of unpolished rice. He quotes his experience at Balik Papan, where he was able to stamp out beriberi by issue to the coolies of a mixture of two parts polished and one part unpolished rice. [This may prove difficult in practice, because in some cases the different sorts of rice require a considerable variation in time of steaming or cooking.]

W. J. Bais.

JOHNSON (J. M.) & HOOPER (C. W.). **Antineuritic Vitamine in Skim Milk Powder.**—*Public Health Rep.* Aug. 26. Vol. 36. No. 34. pp. 2037–2043. With 8 charts in text.

The investigation was to determine whether skim milk powder as prepared by the spray process contained water-soluble vitamin and to ascertain the amount necessary to prevent polyneuritis in pigeons. A pigeon fed on polished rice and milk powder was found to require 30 per cent. of food in the form of skim milk powder to get full protection, which was equal to about 75 cc. of fresh milk daily. It was calculated that a child of 4·5 kilo body weight would require 1,125 cc., about 2 pints, of reconstructed milk daily to provide sufficient of the antineuritic substance.

P. W. Bassett-Smith.

MURATA (M.). **Beriberi-like Disease in Mammalian Animals.**—*Japan Med. World.* 1921. June 20. Vol. 1. No. 2. pp. 12–14.

In an experiment in which rabbits were fed on a diet of polished and unpolished rice, straw and water, 44 out of 147 showed evidence of beriberi-like disease. The symptoms were characteristic after 80 days, with paralysis of the hind legs. If given a diet rich in vitamin B after the onset of the symptoms they generally recovered, but not so rapidly as do birds. The animals received a certain amount of vitamin in the food, but it was not enough for their needs, and a condition of hypovitaminosis was present which produced the beriberi-like symptoms; a similar state, according to the author, is present in human beriberi. He believes that the beriberi-like diseases of animals are identical with human beriberi from an etiological point of view, presenting either a condition of avitaminosis or hypovitaminosis.

P. W. B-S.

KATO (G.), SHIZUME (S.) & MAKI (R.). **The Nature of the Paralysis of Nerve, in the Birds, of Beriberi-like Disease.**—*Japan Med. World.* 1921. July 15. Vol. 1. No. 3. pp. 14–19. With 2 text figs.

The experiments were made on chickens fed with polished rice. The report is difficult to follow and very technical. The velocity of the impulse along beriberi nerves was found to be less than the normal; in starved chickens there was no difference noted. In birds that had been paralysed and cured by extract of bran there was no retardation of the impulse; the functions of the nerves were thus entirely recovered in a few hours. The authors then proceed to show that rice bran extract cures the nerve paralysis by its action on hydrogen ions; that it has a wonderful power to make a large amount of hydrogen ions inactive, and that in the diseased nerves the hydrogen ions are adsorbed. They conclude that the nerve paralysis in chickens produced by a polished rice diet is due to adsorption of hydrogen ions by the nerves.

P. W. B-S.

OGATA (Tomosaburo). **Referat ueber Reiserkrankung des Geflügels (kakkeähnliche Krankheit oder Polyneuritis gallinarum).**—Reprinted from *Verhandlungen der Japanischen Path. Gesellschaft.* 1920. Apr. 3. 75 pp.

The author first gives a short historical sketch of antineuritic food experiments on birds by different investigators, from which it is apparent that no agreement as to the causation of polyneuritis gallinarum has been reached. He then compares the signs, symptoms and pathological anatomy of birds affected with "rice disease" (a term preferred by him to those in general use) with those of birds fed on other dietaries, and concludes that rice disease could be produced only by carbohydrate feeding. His final conclusion from all his observations is that the polyneuritis of birds and the polyneuritis of rice disease are not altogether the same, since the most momentous changes in rice disease are not in the nerves, but in the endocrine organs. The islands of Langerhans are much hypertrophied and their function is increased, but not till after the onset of the symptoms, showing an increased demand on these cells when the disease commences. There is a hypertrophy and hyperplasia of the adrenals, particularly of the medulla, but it is doubtful if there is an increase in function ; it appears that these changes are associated with those in the pancreas. The increased functions of the endocrines is compensatory, as the increase does not appear until after the onset of the disease. Vitamin B is essential together with the hormones of these glands for carbohydrate metabolism.

If vitamin B is wanting, hypertrophy may go on to atrophy, which is best seen in the pancreas of hens which had been given the disease three times. This raises the question whether chronic lack of vitamin B with excess of carbohydrate might not ultimately cause diabetes. The findings as to the respiratory quotient show that in the absence of vitamin B the carbohydrate is not completely broken down to CO_2 ; on the other hand the urates in the urine are increased when the disease begins, thus showing that protein continues to be oxidized, even in greater quantity than before, in an attempt to compensate for the lack of energy derived from the carbohydrate. Thus oxygen continues to be absorbed while CO_2 is not excreted correspondingly. Hyperglycaemia and glycosuria appear when the R.Q. falls, and at the same time diminution of the glycogen content of the liver appears, as in pancreatic diabetes.

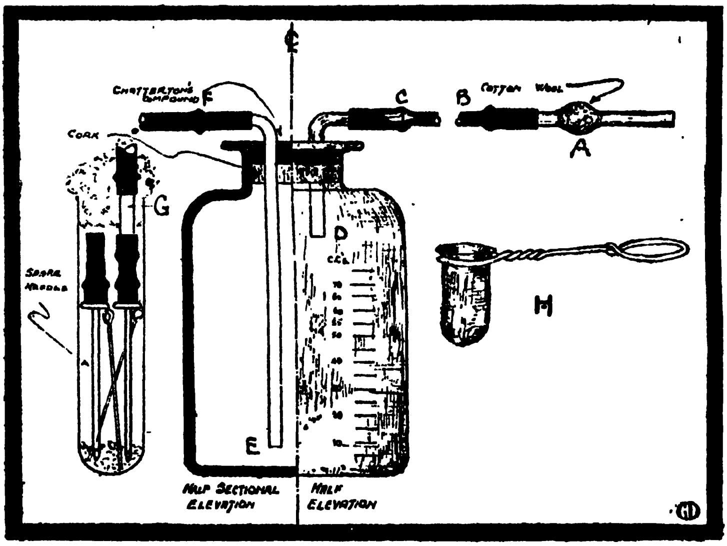
In the author's observations there were many features constantly found in "rice disease" which hardly ever occur in human beriberi. The relationship between diabetes, beriberi and "rice disease" is a very interesting one and requires further study ; the last named the author defines as a disturbance of carbohydrate metabolism caused by the intake of carbohydrate with insufficiency of the vitamin B, which is essential for proper carbohydrate metabolism.

P. W. B-S.

MISCELLANEOUS.

WILLMORE (J. Graham). **Note on a Simple Apparatus for taking Blood-Culture, giving Subcutaneous or Intravenous Injection, and collecting Antitoxin.**—*Jl. Trop. Med. & Hyg.* 1921. July 1. Vol. 24. No. 13. pp. 176–178. With 1 text fig.

"For many years the writer was constantly faced with the necessity of taking blood-cultures, or giving injections of antitoxin or saline solutions, in the desert where the usual apparatus were often not to be obtained, and when contamination from dust and sand storms was especially troublesome. The apparatus which forms the subject of this note was found to fulfil the desiderata required, in that it consists of materials which can be obtained and transported anywhere, put together in any field laboratory, and is so designed that at no time during its manipulation does the blood, the culture medium, or the fluid to be injected come into contact with unfiltered air.



Apparatus for taking Blood-Culture, giving Subcutaneous or Intravenous Injection, and collecting Antitoxin. [WILLMORE.]

[Reproduced by permission from the *Journal of Tropical Medicine and Hygiene.*]

"As shown in the accompanying illustration, the apparatus consists of a container, which may be any bottle with a mouth large enough to take two pieces of glass tubing—even pickle bottles, jam jars, or potted-meat bottles have served. A piece of cork is cut roughly to fit the inside of the neck, and two holes are bored in it with a hot skewer or nail to take the glass tubes.

"The outside of the container may be graduated in five (5) or ten (10) c.c.'s by adding these amounts from a measure and scratching on the glass.

"Four pieces of glass tubing are then cut, the first about 4 in. long, which is flanged at one end and has a small bulb (A) blown in it. The bulb is stuffed with cotton wool.

"The lengths of the next two pieces (E and D) depend upon the size and shape of the container; they are each flanged at the short end, bent at right angles, and inserted through the cork as shown in the figure. The fourth piece (G) is straight, and about 2 in. long; both ends are flanged.

" When cool, the ends B and C and of E and G are connected with rubber tubing of convenient lengths, that connecting F and G being much the longer.

" The lower end of G is connected with a serum needle—preferably of platinum-iridium—by a very short piece of rubber tubing, so that the needle almost touches the glass. The joints may be reinforced with ligatures. The needle attached to the tubing is then placed, with stylets and a spare needle, in a test-tube, which is plugged with cotton wool. If necessary, the plug can be sealed with paraffin or other wax after sterilization.

" If the apparatus is to be used for blood-culture work, the required amount of medium—broth, bile, or taurocholate solution—is introduced into the container, the apparatus fitted together as shown, and the mouth of the bottle above the cork filled with Chatterton's composition. This is a composition containing some kind of pitch, and can be obtained from any motor transport depot; it is used for water-proofing batteries.

" At a pinch, a piece of stout paper may replace the cork, as all that is required is a scaffold to retain the composition in place, and prevent it from running into the container during sterilization. The whole apparatus is then autoclaved; if it be wanted for the collection or injection of serum, it is, of course, autoclaved empty.

" When it has cooled and the pitch is beginning to set, the long bent tube is adjusted to the desired height. The rubber tubes are folded on themselves and ligatured with tape, tied in a bow, and in about 24 hours the composition sets to a firm mass. The apparatus can now be stored for an indefinite period without the contents evaporating or being contaminated; or transported any distance in any position, or shaken, without the contents spilling.

" To take a blood-culture, the tubes are untied, the needle removed from the test-tube and introduced into a vein; the bottle is held below the level of the vein and the necessary amount of blood is run in—aided by suction at A if necessary. When this has occurred, the long rubber tube is pinched with the fingers or a spring clip (previously adjusted), the needle is removed from the vein, flamed and sealed by running in a little paraffin wax which has been sterilized by heat. (A convenient form of container for this can be improvised from a small test-tube and a piece of wire, as shown (H), and sent out with the apparatus.)

" The rubber tubes are then re-tied, the apparatus sent to the laboratory and incubated; if anaerobic cultures are desired, a glucose medium may be used, with a layer of liquid paraffin on top, or, if preferred, A can be attached to a vacuum pump and hydrogen passed through the medium from G.

" For examination, the needle is unsealed by flaming, and the necessary amount of medium blown out on to plates (or into any special medium), the process being repeated as often as desired without exposing the blood-culture medium to any possibility of contamination.

" Further, the long bent tube can be raised or lowered so as to examine fluid from any particular layer, as the composition is easily softened by warming it.

" For use in a place where ordinary laboratory apparatus are obtainable, the container may be a flask or long, narrow, graduated cylinder, fitted with a perforated rubber cork. The principle remains the same." . . . .

A. G. B.

WATKINS-PITCHFORD (W.). **The "Mosquito" Apparatus for obtaining a Blood-Sample by Vein-Puncture.**—*Med. Jl. S. Africa.* 1921. Feb. Vol. 16. No. 7. pp. 133–136. With 4 text figs.

Herein is described and figured an apparatus which facilitates the taking of samples of blood, invented by Mr. W. W. LOUTTIT, a Technical Assistant at the South African Institute for Medical Research.

A. G. B.

McKendrick (A. G.). **The Bleeding of Healthy Rabbits.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920). pp. 58–59.

When large quantities of rabbits' blood are constantly required (*e.g.*, for making media) the author recommends keeping up a batch of twenty rabbits and taking the blood straight from the heart. The following is the technique to be followed :—

" (1) Place the rabbit on its back on the operating table and proceed to the taking of blood without any delay. (2) Have the lower limbs held extended by an attendant and the upper limbs held extended alongside the ears by another. (3) Moisten the fur over an area situated about the middle of the lateral aspect of the chest on the left side. (4) Grip the chest with the left hand, the thumb being over the moistened area and the fingers on the opposite side of the chest. (5) Feel for the heart-beat with the thumb. (6) Press deeply so as to obtain the feeling of the heart's palpitating surface. (7) Shift the thumb to the side of this area. (8) Use a perfectly sharp needle and a smoothly working 20 cc. syringe, containing 3 cc. 1·5 per cent. citrated 0·85 per cent. salt solution. (9) Enter the chest through an interspace in the middle of the determined area with the syringe held horizontally and the hand supported by the table. (10) Penetrate the chest wall very carefully and without forcing to a distance of 1 to 2 cm., keeping up a slight negative pressure in the syringe, as soon as the chest is entered. (11) Watch for the entry of blood into the syringe. (12) Take a grip of the barrel of the syringe with the left hand, and aspirate blood by slow withdrawal of the piston with the right.

" *Notes.*—The heart beats violently for a time after the animal is placed on the table, and it should not be allowed to quieten down before the withdrawal of blood. It is very necessary to feel the heart's beating surface if the operation is to be certainly successful. Unless the needle is sharp, it may push the heart in front of its point. The syringe should be tested for easy movement of the piston, and the absence of leakage at the junction of needle and body, or elsewhere. This is on the assumption that the blood is to be used for the preparation of media. The presence of citrate, which prevents clotting, makes the operation very much easier. The whole of the manipulation of the syringe up to this point is performed with one hand.

" In the case of the 20 cc. syringe manufactured by Collin, negative pressure is exerted as follows :—The little finger of the right hand is passed through the ring at the outer end of the piston rod, and the ball of the thumb rests on the top of the syringe.

" With the body of the syringe in the palm of the hand and this disposition of the fingers, it is easy to exert the slight negative pressure required, by pull of the little finger. The entry of blood into the syringe is often slow, and no attempt should be made to accelerate its entry by forced aspiration. If the stream of blood fails, move the point of the syringe a little backwards or forwards. As a rule, this is quite sufficient to free the eye of the needle. Only one puncture should be made at one time, and the rabbit will then serve over and over again, if well cared for, for removal of blood."

In the course of 11 months the author took over 16 litres of blood from 68 rabbits by this method, the mean number of punctures per rabbit being 17·25, and the mean number of cc. of blood per puncture being 15·9 ; and at the time of writing 31 of the animals were alive and well.

A. Alcock.

Roth (George B.). **Intravenous Administration to Mice, Rats, and Guinea Pigs.**—*Public Health Rep.* 1921. Apr. 1. Vol. 36. No. 13. pp. 661–665. With 6 text figs.

A detailed description, with illustrative figures and plates, of the technique of intravenous administration of arsenicals and the like to small animals. Laboratory workers will be well advised to consult it.

A. G. B.

Nand Lal. **The Re-use of Media.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 731–732.

The utilizing of used media may be necessary in war time when the conservation of all nutritive matter is obligatory.

The author found that three successive (though diminishing) crops of *V. cholerae* could be grown on the same medium, that the said medium was then barren to the Shiga bacillus, but was fertile for three successive (diminishing) crops of *B. typhosus.*

He also found that three successive (diminishing) crops of Shiga bacillus could be grown on the same medium, and that the said medium was then fertile in diminishing degree respectively for three successive crops of *V. cholerae,* and after that for two crops of *Staphylococcus pyogenes aureus.* It is to be noted that the third crop of *V. cholerae* on this much-used medium was very poor, and that the first sowing of *S. pyogenes aureus* was a failure.

The method of experiment in every case was to remove the whole of a 24-hour growth on tryptic-digest casein-agar, measure it, re-sterilize the medium, and to continue sowing and re-sterilizing until no growth occurred.

A. A.

Norris (Dorothy). **The Preparation of a Simplified Culture Medium for Field Workers.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 704–709.

Summary and conclusions :—

" 1. The preparation of a dry nutritive powder from caseinogen is described.

" 2. This powder does not require the addition either of peptone or extractives, but may be made up into solid nutritive medium merely by the addition of agar and normal saline or tap water.

" 3. It is obvious, therefore, that it would be extremely useful for field workers, both on account of its portability and the extreme ease with which it can be made into culture medium.

" 4. It is suggested that the name ' trypsinoids ' be given to the powder.

" 5. Similar experiments with ordinary brewer's yeast, fresh and dried, are described, but it would appear, under the conditions tried, that caseinogen yields the more nutritive powder of the two."

A. G. B.

Harvey (W. F.) & Iyengar (K. R. K.). **Desiccated Nutrient Media.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 364–368.

The authors refer to a paper by E. T. Thompson (*Lancet,* 1910, May 21, p. 1411) on the desiccation of culture media and its practical advantages. They here describe their own method of preparing a nutrient agar powder, from which a nutrient fluid medium can be made simply by extracting with water in the cold and rejecting the undissolved agar. By experiment they find no evidence, as judged by yield of growth, that there is any loss of nutrient quality in media so prepared.

A. A.

NORRIS (Dorothy). **The Preparation of a Culture Medium suitable for the Growth of Organisms used as Vaccines.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 536–544.

The preparation of a culture medium from caseinogen is described, and the results obtained compared with those given by a meat medium. The preparation is not so laborious, and the time occupied in production is much less in the case of caseinogen than in the case of meat. The growths of bacteria obtained are equally good and the cost is much lower.

A. G. B.

HARVEY (W. F.), IYENGAR (K. R. K.) & CHRISTOPHERS (S. R.). **The Influence of Age and Temperature on Bacterial Vaccines.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 715–727.

The effects of age and temperature on typhoid and cholera vaccines are here experimentally considered and tabulated, the conclusion being that these vaccines do not deteriorate in antigenetic potency, as judged by agglutination response, within twelve months, or at any temperature to which they are likely to be exposed. On the evidence here collated it would appear that there is no necessity to adopt any elaborate precautions for preservation of vaccines, or to keep antigen suspensions, such as are used in agglutination tests, at cold storage temperature.

The experience of other observers is referred to, particularly that of STEVENSON, who found (1) that the immunizing as well as the toxic power of broth cultures of *B. pestis* increased up to about the second month of incubation, after which it became stationary, and then gradually decreased; (2) that autolysis diminished the immunizing power parallel with the toxicity somewhere between the second and the third month of incubation; and (3) that length of storage does not diminish the immunizing value of the vaccines at nearly the same rate as it does the toxicity: vaccines over two years old were proved to possess some protective value, and vaccines of fourteen months had strong protective power.

A. A.

MALONE (R. H.) & GORÉ (S. N.). **The Detection of Indole in Bacterial Cultures. A Criticism of Various Methods of applying the Nitroso-Indole and Rosindole Reactions, based on a Comparative Study of their Delicacy and Specificity.**—*Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 490–504.

Conclusions.

"1. Neither the nitroso-indole nor the rosindole reaction provides a specific test for indole, but the latter, in virtue of its great delicacy, is the reaction of choice for detecting indole in bacterial cultures.

" 2. The inconsistent results obtained by workers employing these reactions may be attributed to :—

(*a*) The absence of tryptophane or a tryptophane polypeptide group from the culture media employed.

(*b*) The presence of degradation products of tryptophane, other than indole.

(*c*) Defective methods of applying the tests.

" 3. Some of the methods (Nos. I. and II.) recommended in text-books on bacteriology as a routine test for indole are so crude as to be entirely unsuited for this purpose.

" Others, while possessing great delicacy, are likely to yield fallacious results because they do not provide a means of distinguishing indole from other degradation products of tryptophane (notably indolacetic acid).

" 4. The method which combines delicacy and specificity, and best fulfils the conditions laid down for a routine test is that described under the heading ' Goré's cotton wool plug test.' Under the conditions of these experiments and in actual practice it has been found to be a simple, delicate, and reliable method."

A. A.

GORÉ (S. N.). **The Cotton Wool Plug Test for Indole. A New Technique of applying Ehrlich's Reaction for detecting Indole in Bacterial Cultures.**—*Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 505–507.

" Stated briefly, this test consists in moistening the under-surface of the cotton wool plug of the culture tube with a few drops of Böhme's solutions and heating the tube for a few minutes. In the case of a positive result a rose colour appears on the under-surface of the plug.

Materials required for the Test.

" Böhme's Solution No. 1—	
Para-dimethyl-amido-benzaldehyde.. ..	1 gm.
Absolute alcohol	95 cc.
Hydrochloric acid	20 ,,
" Böhme's Solution No. 2—	
Potassium persulphate	1 gm.
Distilled water	100 cc.

" *Note.*—These two solutions may be conveniently stocked in glass-stoppered drop bottles.

" Some arrangement for keeping water gently boiling.

Details of the Test.

" 1. Remove the plug of the culture tube and, if it does not already consist of white absorbent cotton wool, cover its under-surface either with a thin layer of such cotton or with a piece of filter paper.

" *Note.*—A white absorbent surface is essential, as Ehrlich's colour reaction is to be effected and observed thereon.

" 2. Moisten evenly the under-surface of the plug first with a few (4–6) drops of the persulphate solution, and then with a few drops of the para-dimethyl-amido-benzaldehyde solution.

" *Note.*—The persulphate is necessary, as it helps to oxidize the indole compound from a lavender to a rose colour ; the latter colour is more intense than the former, and the persulphate thus adds to the delicacy of the reaction.

" 3. Replace the treated plug, and push it down the tube until it is an inch or an inch and a half above the surface of the broth culture.

" *Note.*—This is essential, in order that when the broth is heated most of the indole-laden vapour from the broth may be absorbed by the under-surface of the plug, instead of condensing on the walls of the test tube.

" 4. Place the prepared culture tube upright in the gently boiling water-bath.

" *Note.*—This precaution is necessary to prevent the broth from coming in contact with the plug and thus vitiating the specificity of the test.

" 5. Allow the tube to be heated for about fifteen minutes.

" *Note.*—During this period sufficient indole volatilises to give a positive reaction even when the quantity of indole is as little as 0·0005 milligrammes per cubic centimeter of the broth culture.

" 6. Now remove the test tube from the water-bath, and examine the under-surface of the plug *in situ* in a good light.

" *Result.*—If indole be present in the culture, the under-surface of the plug becomes rose-coloured owing to the volatilised indole reacting with the Böhme's solutions.

" In the case of a negative result, the cotton wool plug remains unaffected.

" *N.B.*—The test may be performed with agar as well as with broth cultures.

" From the above description of the cotton wool plug test for indole, it will be seen :—

" (i) That *specificity* is attained by subjecting only the volatile products to the colour reaction, indole being the only volatile chromogenic product in aerobic bacterial cultures.

" (ii) That *delicacy* is attained, first, by using Ehrlich's aldehyde—the most sensitive reagent for indole—and, secondly, by performing and observing the colour reaction on a white absorbent surface.

" (iii) That *simplicity* is attained by moistening the under-surface of the cotton wool plug of the culture tube with a few drops of Böhme's solutions and heating the tube for a few minutes. The presence of indole is denoted by a rose colour on the under-surface of the plug."

A. A.

NAND LAL. **The Viability of Bacterial Cultures.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 728–730.

The conclusions recorded in this paper are (1) that sealing of cultures is an important factor in their preservation, and (2) that haemophil organisms, such as meningococcus, gonococcus, and *Bacillus influenzae*, can be preserved for at least 50–60 days without subculture, if kept continuously at incubation temperature.

A. A.

HARVEY (W. F.). **Bacteriological and Laboratory Technique.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 270–303.

This is the first instalment of a laboratory worker's *vade mecum* arranged somewhat after the method of certain catalogues of scientific literature. The work is to be continued in serial form and will take several years to complete. It is intended for those who are familiar with the technique of a bacteriological and pathological laboratory, not for beginners.

A. A.

HARVEY (W. F.). **Production of High Titre Sera.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 682–700.

The conclusions of this paper are as follows :—

" 1. A convenient series of doses for the intravenous inoculation of goats with living organisms is that number of organisms corresponding to 1, 2, 3, 4 mgms. of dried bacterial substance. Fowls can stand large doses intravenously.

" 2. No harm results from frequent repetition of intravenous inoculations in goats or fowls.

" 3. A seven or ten-day interval is a convenient one to allow between inoculations, and may be adopted in goats and fowls without reference to restoration of body weight.

" 4. Intravenous inoculation of antigen—as is now well known—is more efficient for the production of antisera than intraperitoneal. Subcutaneous inoculations are not satisfactory, except from the point of view of lessened fatality.

" 5. Very large doses of living organisms, such as the staphylococcus or cholera, can be given intravenously to goats. Organisms of the dysentery group have to be more carefully administered than others.

" 6. Suspensions of living organisms obtained from laboratory strains may be given *ab initio* intravenously in goats.

" 7. Good antisera are obtainable by confining oneself to intravenous inoculation of suspensions of killed organisms.

" 8. Organisms simply desiccated form a very satisfactory, very stable, and very efficient antigen.

" 9. Rabbits yield a serum of higher titre and higher specificity than goats. Goats are exceedingly convenient animals for the production of high titre sera, and yield far larger amounts of serum than rabbits. Goat serum can be procured in such large quantities that it may be issued undiluted. Fowls have certain advantages over both goats and rabbits.

" 10. The titre of an agglutinating serum, once raised, can be very easily maintained in goats by subcutaneous inoculation."

A. G. B.

MACKEY (G.). **Preservation of High Titre Agglutinating Serum and Corresponding Antigen.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 733–736.

Experimental data from antigen suspensions and from antisera to *B. paratyphosus* B and to *M. melitensis* are here tabulated in support of the following conclusions :—

" 1. Antigen suspensions used for agglutination purposes preserve their agglutinability for a considerable time at ordinary room temperatures.

" 2. Agglutinating antisera lose their potency only at a slow rate when kept at room temperature. A *M. melitensis* serum loses its potency more rapidly than a *B. paratyphosus* B serum.

" 3. Agglutinating antisera may lose their potency comparatively slowly when kept at 37° C., as in the case of a *B. typhosus* B serum, or rapidly even to complete loss, as in the case of a *M. melitensis* serum.

A. A.

WORDLEY (E.). **A New Method for the Isolation of Organisms from Faeces and Sputum, with Some Observations on Haemolytic Streptococci in Faeces obtained by this Method.**—*Jl. of Hyg.* 1921. July. Vol. 20. No. 1. pp. 60–68.

The method here described was devised by Professor L. S. DUDGEON in the Balkans during the war.

" A portion of the faeces, about a small teaspoonful, is evenly spread over a porous tile resting on an asbestos mat, and allowed to dry for from thirty minutes to two hours, at room temperature, according to the amount of water or mucus in the specimen. When the faeces are dried to a stiff paste this is scraped off and evenly spread on a second tile, and allowed to dry for a further one to two hours, or until it has become a fine dry powder when scraped off. A quantity of this dry powder is transferred to a plate, and evenly spread over the surface with a glass spreader. If the faeces are liquid, as much as possible should be poured on the first tile short of letting it run over the edge. By using two tiles one after the other, it will be found that however liquid the faeces are, or however much mucus is present, complete drying can be obtained. It is important, in order to get the best results, that the material should be completely dried on the second tile before plating, and when scraped off be in the form of a sand-like powder, with no trace of stickiness.

" By this method excellent separation of individual colonies is obtained over the whole surface of the plate, with no tendency to run together, so that suspicious colonies can be picked off with ease. It is quick, and since it is equally applicable to any infection, is most economical with media, since different methods do not have to be adopted according to the nature of the organism suspected of being present. Using other methods than the tile method on an erroneous supposition of the infecting organism, the latter may be easily missed, as will be shown later.

" By this method of drying on tiles it is extremely easy to isolate small portions of mucus, which would be missed if the solid stool were examined, and thus is a most suitable procedure in enabling one to examine likely portions for *Entamoeba histolytica* cysts. Naturally in this instance complete drying is not resorted to, but just sufficient to produce a stiff paste, in which pieces of mucus are easily seen. The same procedure can be followed also in searching for the ova of parasitic worms."

In plating from sputum the same procedure is adopted. The tile should be covered with a bell jar. The dried sputum is a light, flaky, very fine powder, and it is advisable when scraping it off the tile to work behind a screen.

" The tiles used are white unglazed porcelain tiles, about 6 in. square. For use each large tile is divided into four pieces, which gives a more convenient size to spread the material on. When required for use they are sterilized by heat, an electric hot plate is very convenient, but this can be done equally well by placing them on an asbestos cooking mat supported on an iron tripod and heating them with a Bunsen burner. Such asbestos cooking mats can be obtained from any ironmonger or stores. When cooled the tiles are ready for immediate use. For spreading the faeces and for scraping off the dried residue an old knife, especially kept for the purpose, is very convenient, since it can be easily sterilized by heating to redness."

The method was used in a series of examinations of stools of patients known to be suffering from an infection of the Enterica group, in a case of Flexner dysentery, and in experiments in which a pure culture of B. Flexner was added to faeces.

Total number of examinations	91
Negative results by both dry method and alternative method used	53
Total positive results by dry method	33
Total positive results by alternative method, *i.e.*, either peptone water brilliant green for the enteric group, or from broth for dysentery infections with negative results from dry method	5

" Of these 33 positive results by the dry method, positive results were also obtained in 14 instances by one of the alternative methods, according to the nature of the infection. . . . . ."

A. G. B.

i. MALONE (R. H.). **The Production of *B. influenzae* Vaccine on a Large Scale.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 56-62. With 1 text fig.
ii. ——. **A Note on the Large Scale Production of Pneumococcus Vaccine.**—*Ibid.* pp. 63-65.

i. *B. influenzae* can be manufactured on a large scale by growing the organism in Douglas mutton-broth (pH 7·2-7·4), containing 0·5 per cent. glucose and 0·5 per cent. pigeon blood. And by the process described in full detail in this paper the final product is a suspension of organisms in normal salt solution practically free from protein derived from the broth.

The author thinks that this method should also be applicable to vaccine production for organisms other than *B. influenzae.*

ii. This short note deals with the method described above as applied to the large production of pneumococcus vaccine. The steps of the method are described in detail.

A. A.

HARVEY (W. F.). **Note on Dilution of Reagents.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 131-135.

" Dilution of concentrated suspensions or solutions is a very common procedure in bacteriology. When the dilution is of a simple character there is little difficulty in the calculation necessary to determine what is to be done. But there are cases in which the dilution required is not of a simple kind. An example will make the point clear. It is required, say, to make from a suspension of concentration (or dilution) 3 in 10 another of concentration 2 in 11 by adding to it an appropriate quantity of diluent. We may work out the answer by expressing the concentrations as fractions, viz., 3-10 and 2-11. Bring both to the same common numerator, which makes then 6-20 and 6-33, respectively. Thus the undiluted suspension consists of 6 parts (or units or volumes) in 20, and the concentration to be obtained from it is 6 in 33. If we take 20 parts of the former, it will contain 6 parts of the suspended material. Add now to these 20 parts of suspension 13 parts of diluent, and so make the total number of parts up to 33. This total volume of 33 parts will still contain only 6 parts of suspended matter, and will be the dilution required. The procedure here very simply illustrated is one of bringing fractions to a common numerator, and may be set out as a *rule* thus :—

" *Rule.*—Multiply up crosswise numerators and denominators of the fractions representing strength of fluid to be diluted and strength of the dilution to which it is to be brought. Subtract the lesser figure thus obtained from the greater. Then take, in volumes or parts or units of the fluid to be diluted, the lesser figure, and add as diluent in volumes or parts or units the number obtained by subtraction.

" It is obvious that it will often be possible to reduce the figure obtained to simpler proportions. If it is required to add 15 parts of diluent to 5 parts of a given fluid, this is the same as adding 3 to 1."

The author gives numerous examples of the working of the rule.

A. A.

HARVEY (W. F.). **Estimation of Erythrocyte and Haemoglobin Content of Blood.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 479-491.

This article deals with : (1) Estimation of volume of erythrocytes ; (2) estimation of blood content by tint and turbidity ; (3) estimation of haemoglobin.

1. The method described replaces the Thoma-Zeiss counting chamber, which, when a number of cases have to be examined, is time-consuming and causes eye-strain. Objections against the use of volume as a measure have been that the volume varies greatly according to the type of anaemia—this the author doubts—and that no account is taken of the disturbing element of leucocyte content, which he deems unimportant. The author uses simple capillary tubes, the method being a variation of one described by Almroth WRIGHT. Full details are given. Criticisms are met and results obtained compared with those of the Thoma-Zeiss method.

2. The author has succeeded in obtaining a fluid which preserves the blood indefinitely from haemolysis, but not one which preserves the tint. He uses formalin, 10 per cent. in 0·85 per cent. sterile salt solution.

A. G. B.

HARVEY (W. F.). **On the Use of Birds as Laboratory Animals.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 492–494.

In a country like India rabbits and guinea-pigs are neither easily procurable nor cheap. The author made trial, therefore, of the common fowl, which was found quite suitable for the production of high titre agglutinating sera, but not for that of haemolytic sera for the Wassermann test. Guinea-fowl and pigeons were also tried, the latter bird, for its size, being the most satisfactory of the three; it has a comparatively large wing vein for inoculation and withdrawal of blood.

" *Technique of Production of Sera.*—(1) Use in all the birds the series of doses of living bacteria equivalent to weights of 1, 2, 3 and 4 mgm. of dried bacterial substance, or possibly a slightly lesser dosage, seeing that this series gives rise to loss of weight. (2) Administer these doses intravenously at intervals of one week. (3) Test the potency of the serum ten days after the last injection. (4) Use a large-bore 20 cc. syringe needle for bleeding, if the serum is up to titre. (5) Pass the needle into the wing vein, which should be denuded of feathers, and collect the blood, which issues in drops, in a test tube. (6) Place the test tube immediately in the sloped position in the incubator at 37° C. for two hours. (7) Remove the test tube and set vertical. (8) Leave overnight and pipette off the serum which has collected in the morning. (9) Test the potency of the serum. (10) Dilute with 0·85 per cent. sterile salt solution, containing 0·5 per cent. carbolic acid, to give an agglutinating titre of 1 in 1,000 for the specific organism. (11) Issue for use."

In two examples given in which *B. typhosus* was used a titre of 1 in 8,000 was reached in fowl and pigeon respectively.

A. G. B.

MOUCHET (R.), VAN NITSEN (R.) & WALRAVENS (P.). **La séro-réaction de Bruck en Afrique tropicale.**—*C.R. Soc. Biol.* 1921. Oct. 22. Vol. 85. No. 29. pp. 720–722.

For the isolated practitioner in the colonies the paraphernalia of the Wassermann test are an impossibility. In seeking for a simple substitute for that test the authors have investigated the Bruck test, and they find that while in syphilis and yaws the Bruck test is as certainly positive as the Wassermann, it also is generally positive in malaria. As in the tropics many Europeans and most natives are chronic malarians, the Bruck reaction is no substitute for the Wassermann in tropical colonies. Another observation here recorded is that while in the course of treatment with arsenobenzol for syphilis and yaws the African native ultimately gives a negative Wassermann, the Bruck reaction is persistently positive.

A. A.

HEINEMANN (H.). **Vergleichende Blutuntersuchungen mit den Methoden von Wassermann, Sachs-Georgi und Meinicke (DM). I. Mitteilung.** [Comparative Blood Examination by the Methods of Wassermann, Sachs-Georgi and Meinicke (DM). Part 1.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 3. pp. 80–90.

This is a report in much detail of a comparative examination of 1,000 sera with a view to determining whether in small tropical hospitals where there is no means of carrying out the Wassermann test any other test might be substituted for it. The paper cannot be summarized briefly, and it is hardly worth citation at full length, since the author himself admits that the tests here compared with it (Sachs-Georgi and Meinecke) are about as difficult to provide for as the Wassermann test itself.

A. A.

STÉVENEL (L.). **Le bleu au permanganate.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 207–209.

Permanganate blue, which is a convenient stain for blood-films, is prepared as follows :—

In two separate vessels dissolve (*a*) 1 gm. of ordinary methylene blue in 75 gm. H_2O, and (*b*) 1·50 gm. $KMnO_4$ in 75 gm. H_2O.

Mix the two solutions in a flask. A copious precipitate is formed, with disengagement of heat, and the supernatant fluid becomes almost colourless. Presently the precipitate becomes in great part redissolved as a violet-blue solution. Leave the flask in a hot-water bath for half an hour for the reaction to be completed, and then filter. The liquid after filtration is permanganate blue.

For differential staining of blood-films and smears flood the fixed film in a 1 in 2,000 solution of eosine for three minutes, and then, after washing, flood in a 1 in 10 dilution of the above permanganate blue for twenty minutes for haematozoa, and for an hour for treponemata, and then wash and quickly dry.

A. A.

GRANT (Garnet B.) & WILSON (Eric R.). **Two Stains used in Preference to Wright's Stain in the Routine Staining of Blood Smears.**—*Jl. Lab. & Clin. Med.* 1921. July. Vol. 6. No. 10. p. 593.

For differential counts, but not for malaria parasites, double staining with a saturated solution of eosin in methyl alcohol and Mallory's instantaneous haematoxylin is here recommended. For malaria parasites they prefer 0·25 per cent. watery solution of Azur II. as the second stain.

A. A.

KOP (W. A.). **De normale verhoudingen der bloedcellen in de tropen.** [The Normal Proportions of the Blood-Cells in the Tropics.] —Leiden: 1920. pp. 1–38.

This small octavo publication is a Dutch thesis presented to the University of Leyden, in December 1920, for the degree of Doctor of Medicine. Although the conclusions reached by the author are not strikingly novel, the thesis bears evidence of careful and critical work; and as it is, moreover, written shortly and to the point, it merits the attention of other workers in the tropics.

The author begins by noting that a knowledge of the cellular constitution of the blood in normal residents in the tropics is indispensable, since it is obviously impossible to interpret blood-counts made for diagnostic purposes in diseased conditions unless we know what to expect in health. He observes that, in spite of all the work already done, there is still no unanimity regarding the "normal" blood-picture, and more especially regarding the Arneth index, in dwellers in the tropics. The present work was undertaken to settle these points.

The author made his observations at Weltevreden, Java, where he investigated altogether 93 normal healthy individuals—55 Europeans and 38 natives. He describes his technique in some detail, and justifies the various methods which he adopted in his researches. It may be noted that the blood-counts were made on films taken, with suitable precautions, before nine o'clock in the morning from subjects with empty stomachs.

The results of the investigation are recorded in a series of tables, and may be summarized as follows:—

1. The total numbers of red and white corpuscles are the same in tropical dwellers as in persons living in temperate climates. The haemoglobin content is also normal, and the haemoglobin index = 1.

2. In the persons studied the percentages of the various kinds of leucocytes were found to be:—

	Average.	*Variation.*
Mast-cells	0·5	0–3
Eosinophils	3·5	1–8
Large mononuclears + transitional cells	6·0	2·5–11
Lymphocytes	50·0	26·5–70
Neutrophils	40·0	19·5–63·5

3. The Arneth index is normal, both in natives and in Europeans (*i.e.*, there is no shift to the left).

4. The only difference observed between the blood-count of Europeans and that of natives was in respect of the eosinophils, which were found to be more numerous in natives. This eosinophilia of native subjects is satisfactorily explained by their higher rate of infection with intestinal worms.

The general conclusion reached is, therefore, that the cellular constitution of the blood of normal persons living in the tropics is essentially identical with that observed in healthy persons dwelling in temperate climates.

Clifford Dobell.

Bais (W. J.). **Vergiftiging met zaden van** *Artocarpus polyphema.* [Intoxication by the Seeds of *A. polyphema.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 352–356.

Artocarpus polyphema (Malay: Tjempedak) is a well-known fruit in the Dutch East Indies. Besides the fleshy part the seeds are eaten, generally roasted. In the literature nothing is reported about toxicity of the seeds, though the native population seems to be aware of some danger.

The author saw intoxication in 16 Javanese after use of the seeds (4–400), the symptoms being nausea and vomiting, giddiness, a low temperature, and a slow pulse; in the more serious cases coma resulted, lasting from 2–5 days, with large pupils reacting very slowly to light.

The nature of the toxic substances remained unknown.

W. J. Bais.

KOSTER (S.). **Een vergelijkend reukonderzoek bij Inlanders van Ned.-Oost Indië en Hollanders.** [A Comparative Investigation of the Power of Smelling in Natives of the Dutch East Indies and in Dutchmen.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 165–189. With 2 charts.

The author made a series of detailed experiments to compare the power of smell of natives of the Dutch East Indian Archipelago with that of Europeans. The test substances he used were acetic acid and ammonia in different dilutions. He comes to the conclusion that natives do recognize these smells (and probably others as well) in far higher dilutions than Europeans do. He discusses the possible reasons of this difference, and thinks that the lower stage of cultivation is responsible for it. HENNING is of the opinion that in uncultivated races the power of smell is developed by the higher degree of practice of the smelling organ, whilst, on the other hand, the frequency of diseases of the nose in European races is liable to interfere with their sense of smell in general.

W. J. Bais.

DE RAADT (O. L. E.). **Uittreksel uit het jaarverslag over 1920 van den Geneeskundigen Dienst der Ombilin-mijnen.** [Extract from the Year Report of 1920 on the Medical Service of the Ombilin Mines.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 138–156.

This extract concerns anaemia, enteric and beriberi. The features of general interest are the following:—

For the detection of hookworm eggs, if these are scarce, the author recommends mixing part of the faeces well with a saturated solution (33 per cent.) of common salt. The eggs are lighter than the salt solution, and accordingly appear drifting on the surface, whence they can be drawn with a little spoon. [The workers of the Rockefeller Institute use for the same purpose equal parts of saturated salt solution and glycerine.]

Anaemia amongst the miners is considered to be due to either worm disease, malaria, or syphilis (or framboesia); this last diagnosis is often made "per exclusionem," and is then generally confirmed by the serum test. As such the Sach and Georgi method was found by the author to be a trustworthy one.

The diagnosis of typhoid was made by blood-culture. The author takes 2 cc. of blood and adds it to 5 cc. of sterile ox-bile. After about two days' incubation at 37° C. a platinum loop of the blood bile is inoculated in broth and left at 37° for another day. If any growth appears in this tube its contents are inoculated into two other tubes of broth, one of which is mixed with agglutinating typhoid serum in a dilution of twice its limit of agglutination power; the other tube serves as a control. If the culture contains typhoid bacilli in the serum tube agglutination will occur during the growth and be apparent after 5–6 hours. Later it becomes too cloudy to give clear results.

[Practically the same method has been described by LÖWENFELD, *Münch. Med. Woch.* 1915. Vol. 62. pp. 433.]

W. J. Bais.

BOOK REVIEWS.

KIRKPATRICK (Henry). **Cataract and its Treatment.**—xiv + 201 pp. With 70 illustrations in text. 1921. London: Oxford Medical Publications: Henry Frowde & Hodder & Stoughton. [Price 12*s.* 6*d.*]

Although Colonel Kirkpatrick is well known as a fluent and able writer in various ophthalmic and other medical periodicals, this book constitutes his first effort as an author, and in congratulating him on its appearance we would express the hope that it will be very far from the last of the serious works of his pen. As Superintendent for many years of the Government Ophthalmic Hospital, Madras, he had opportunities that are granted to very few men in a generation; for not only is the surgical material immense, but the organization for the examination of the cases before operation and for their subsequent after-treatment and observation has been brought to a very high pitch indeed. Amongst the many subjects which have interested him, that of cataract has naturally been one of the most prominent owing to the fact that about 1,200 extractions are performed annually by the Superintendent of the Institution. As might have been expected, almost every page of the book impresses the reader as having been written by an expert of no mean order, who has not merely learnt his facts at first hand, but has brought to bear on their compilation and on their analysis a critical judgment and a wide sympathetic understanding of what others have done and written in the same field.

The chapters deal in turn with (1) the development, anatomy, and nutrition of the lens; (2) the vexed question of the aetiology of cataract; (3) the clinical varieties of senile cataract; (4) the non-operative treatment of cataract; (5) the surgical treatment of cataract (spread over seven chapters); (6) the treatment of special forms of cataract (three chapters); and (7) a discussion of the results obtained by operation.

Every chapter closes with a list of the references, placed in alphabetical order. There is a good index of names, and another of subjects. When it is said that the book is published by the Oxford Medical Publications, that alone is sufficient guarantee for all that concerns the printer. Kirkpatrick's style is pleasant and easy to read. His book will be a boon to many of those who are interested in cataract. It will certainly be a standard work, which will enhance his reputation, and which will find a very large circle of readers.

R. H. Elliot.

AMSTERDAM. **Vereeniging "Koloniaal Institut" Negende Jaarverslag 1919.**—Ditto. **Tiende Jaarverslag, 1920.**—137 pp. and 112 pp. Druk de Bussy

The Colonial Institute of Amsterdam is surely to be congratulated in including among its many interests a section of tropical hygiene—a section adorned by numerous distinguished names and justified by its long list of published investigations. Among the recent publications catalogued in these two volumes are papers on trypanosomiasis, malaria, dysentery, intestinal protozoa, and plague; a long list of important papers on Anophelines and their biology and pathogenic bearings by SWELLENGREBEL and his colleagues; and numerous papers relating to bacteriology.

A. Alcock.

BENCHETRIT (A.). **Nuevas Disertaciones.**—112 pp. 1921. Caracas: Tipografia Guttenberg.

These dissertations touch many strange points in their comprehensive sweep. They include, besides biography and bibliography and excursions into mathematics, such varied subjects as dietetic treatment of vesical calculus, disadvantages of a milk diet in fevers, relation between molecular structure and physiological effects of drugs, cure of leprosy, coefficient of detoxication, the place of microbes in the great scheme of Nature, the moral responsibilities of teachers of arithmetic, the problem of the Jew, and leishmaniasis in Venezuela.

A. A.

NEVEU-LEMAIRE. **Précis de parasitologie humaine.**—vi + 466 pp. With 313 text figs. 5th Edition. 1921. Paris: J. Lamarre, 4, rue Antoine-Dubois. [Price 22 fr., or post free 24.50.]

This is a students' text-book, in which all the parasites of man—using the term "parasite" in its most comprehensive sense—are reviewed in systematic order, and the more important facts of their individual structure, life-history, and pathological significance are condensed with a minimum of recensory impedimenta. The bacteria occupy 17 pages, the fungi 71, the protozoa 80, the flatworms and roundworms 120, and the arthropods 115. In the section dealing with protozoa three pages are devoted to *Entamoeba histolytica* and amoebiasis, five to coccidia, four to trichomonads and Lamblia, 14 to malaria parasites and malaria, and 10½ to trypanosomes and trypanosomiasis. Although the number of pages is less in this than in the immediately preceding edition, this is due, not to any retrenchment of the matter, for the matter is increased, but to typographical rearrangements. That the book supplies a want, and is appreciated, is proved by the fact of its reaching a fifth edition.

A. A.

"LEWIS'S—1844-1921."

In a pamphlet entitled "Seventy-seven Years, 1844-1921" Messrs. H. K. Lewis & Co., Ltd., give an interesting account of their firm's development from the little bookshop, above which Mr. H. K. Lewis lived when the business started in 1844, into the well-known publishing and bookselling house of to-day. Illustrations and short descriptions are given of the activities of the various branches of the business, including the Publishing and Wholesale Department, the Bookselling and Medical Stationery Departments, the Postal Department, the Circulating Library, which now contains about 21,000 volumes, the Reading and Writing Room, and the most recently added Secondhand Book Department

BIBLIOGRAPHY ON HOOKWORM DISEASE.

The Rockefeller Foundation (61, Broadway, New York, U.S.A.) announce that a Bibliography on Hookworm Disease of about 450 pages will shortly be ready for distribution as Publication No. 11 of the International Health Board, and that, so far as a limited edition will allow, copies will be sent to all especially interested persons who make application to the Rockefeller Foundation.

TROPICAL DISEASES BUREAU.

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MALARIA: A CRITICAL REVIEW.

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The Great War produced a veritable flood of malarial literature, consequent on the introduction to the disease of many new workers whose chief asset was keenness. This output was not, in the main, of exaggerated value. On the other hand the war afforded to experts new experiences and new angles of view, of which ready opportunity was taken.

A consideration of the diversity of conclusions drawn from personal observations leaves the impression that much of the contradictory opinion held on malaria is due to a provincialism which it is clearly one of the main functions of this *Bulletin* to combat, and which results in the basing of world-wide conclusions on a geographically restricted experience. Unquestionably the general lines of the life-histories of the malarial parasites and of their insect hosts are uniform; yet details vary locally, and indeed in the same locality from time to time. If a mosquito species has been shown to exhibit in one locality enjoyment of a particular habitat, preference for a particular host, and limitation for oviposition to collections of water of a particular kind, there will be no necessary control of malaria in another locality, served for infection purposes by the same mosquito, should the sanitarian limit his activities to the procedures which were successful in the first (vol. 17, p. 130).

The Species of Malarial Parasites.

There is still no complete agreement as to whether there are several stable or one polymorphic species of malarial parasite. The morphology of the various forms has been dealt with by PRATT JOHNSON (vol. 17, p. 296), ACTON (vol. 18, p. 335), CRAIG and others, and there is no need to recapitulate them; except possibly to point out that ACTON's coloured plates are particularly valuable, and that CRAIG holds that there are two species of the malignant parasite, a quotidian and a tertian (vol. 18, p. 93). ACTON, too, insists that it is not merely in morphology that these various forms differ, but in cultural characteristics, incubation periods, symptomatology—in which presumably he includes the asexual life-history of the parasite—and, as he believes, in their reactions to quinine. Moreover, as MAYNE says (vol. 17, p. 295), "If one carefully analyses the accounts in the literature of approximately one hundred mosquito experiments an incontrovertible fact presents itself. In every instance of positive result the type of parasite imbibed with the blood of the donor was always reproduced with regularity in the volunteer host."

Such considerations might well be held conclusive of a multiplicity of species, but there are those who say "No." For instance, CREMONESE, as the abstract runs (vol. 15, p. 401), "assumes that the Anopheles which appear in April and May are few and do not bite; therefore the benign tertian agues at that time are due to infections in the previous autumn; therefore the *Plasmodium falciparum* must change into *P. vivax* with the season." Similarly GRASSI (vol. 17, p. 293), struck by finding, in a family of seven, six infections within a week, three with benign and three with malignant tertian malaria, points out that while in July–August the proportion of the two forms is 92 to 64, in September it is 11 to 107. Assuming that these forms represent two species of parasite, the proportions, in his estimation, ought not to have reversed themselves—partly because more mosquitoes must have been infected earlier with benign than with malignant forms, and partly because crescents are so rare from April to August that the autumn epidemic could not have been caused by them. He concludes that there is one parasitic species, reappearing regularly in the same form at each relapse, except that in March and April the malignant tertian form relapses as benign tertian and that in prolonged infestation the form is likely to change. Again, PLEHN (vol. 15, p. 248), in advocating the unicity of species, holds that the large benign forms acquire in mosquitoes, under the action of summer heat, the property of destroying the erythrocytes before full stature is reached and of producing crescents. Assuming, quite incorrectly, that the small malignant forms occur exclusively in tropical climates, he points out that infected mosquitoes live there throughout the year at a uniformly high temperature.

These three lines of assumption (they are not lines of reasoning) based on local experiences, yet imply, on consideration, one further assumption, namely, that an infection, when present, can infallibly be detected by an examination of the blood. In this matter the work of RENNIE, ACTON, CURJEL and DEWEY (vol. 18, p. 335) is pertinent. Their skill cannot be questioned, and yet they, working at Dagshai, in climatic conditions under which primary infection was unknown and reinfection accordingly, for practical purposes, dismissible, record (to take one only of their several series) 564 negative examinations in 82 persons in whose blood the benign tertian parasite subsequently appeared. It is perhaps not widely appreciated how uncertain diagnosis by the ordinary thin film may be. That this is so is suggested by the recent advocacy of so-called provocative measures, a long list of which SASSEN has compiled (vol. 14, p. 271), and which are intended to throw the parasites into the peripheral blood in sufficient numbers for ready detection. Ross's thick-drop method has the same aim, and evidence of its success is furnished by TAYLOR (vol. 11, p. 36), who examined a thick and a thin film from each of many patients. Of these, 526 thick films, examined for a maximum of five minutes, were positive. Of the corresponding thin films, examined for a maximum of thirty minutes, only 125 were positive. Again the doubt that overhung the first three days of Dr. MANSON's classical inoculation experiment will come to the memory in this connection.

If it be impossible to state from an ordinary blood examination that malarial infection is certainly absent, it is equally impossible, when one form of parasite has been detected, to state that the infection is necessarily a pure one. This is no theory. ACTON, RENNIE, CURJEL and DEWEY found that of 102 cases whose medical history sheets showed that they had harboured crescents, 64 suffered in Dagshai from benign tertian relapses. Indeed it seems a particularly courageous assumption to conclude, when one form displaces another in the peripheral blood, that this is due to anything more than an imperfect diagnosis. With the unicity theory requiring so much assumption, most readers are likely to agree with "conservative scientific opinion" that to explain and to explain away have sometimes unhappy resemblances.

Life-History.

The stereotyped life-history is not unquestioningly accepted. HENSZELMAN (vol. 14, p. 272), seeing what others interpret as the fortuitous combination of a gametocyte and a sporont in a single erythrocyte, pronounced it to be an instance of sporulation of a gametocyte. ALCOCK's comment in abstracting a paper by THOMSON (vol. 11, p. 1) cannot be bettered. "In postulating the reversion of a gamete into a schizont—the gamete always being a peculiarly-determined and highly differentiated cell—SCHAUDINN invoked a phenomenon which, so far as is known, is unparalleled in biology." WENYON * is equally against SCHAUDINN's views.

LAWSON's view (vol. 15, p. 419) that the malarial parasite, even the crescent, flits, so to speak, from erythrocyte to erythrocyte, culling the haemoglobin from each as the bee culls honey from a flower, is not accepted.

Insufficient experience has led to expression of the view, which is contrary to fact, that gametocytes only appear after the administration of quinine. Since the gametocyte is the sexual stage and the mosquito the definitive host (that in which the sexual process takes place) this belief implies that man has created the most important biological phase in the creature's life-history. Man is rarely at his best when he assumes the god, affects to nod, and seems to shake the spheres.

ACTON, in April, 1919 (vol. 18, p. 335), wrote that natural cure results from the exhaustion of the asexual cycle by its conversion into gametes, which are destroyed by phagocytes or die of senility. The steps of the argument have, however, not yet been published. BLACKLOCK's careful report (vol. 18, p. 332) on the recent fatal case of *P. falciparum* infection contracted in or about Liverpool suggests that the optimum habitats of the sexual and asexual forms differ, that for the gametocyte being in the bone marrow and that for the segmenting forms in the spleen. Much of the existing diagnostic confusion results from the belief that the optimum habitat is the blood. In *A. maculipennis* (ROUBAUD, vol. 13, p. 63) the feebly refractile oocysts of *P. vivax*, with their fine granules of grey pigment in loose chainlets, give rise to mature sporozoits in 11 days at 25° C. and in 15 days at 15°–23° C., while the strongly refractile oocysts of *P. falciparum*, with their large granules of black pigment, reach the same stage in 14 days at 25° C. and in 20 days at 15°–23° C. WENYON's experiments with *A. maculipennis* gave similar results; with *A. superpictus* both parasites developed with equal readiness. It must not be assumed, however, that gametes have merely to enter a favourable mosquito host for sexual union to occur. MITZMAIN (vol. 11, p. 32) reports the finding of large numbers of crescents in Anopheline dejecta, a possible explanation of WENYON's observation that different Anopheles females fed on the same person develop very different numbers of cysts. The course of the sporozoits in the mosquito from stomach to proboscis is no instance of instinctive directional migration, as is the seasonal migration of birds. MAYER for Proteosoma, and MÜHLENS for *P. vivax*, have shown that there is a veritable "septicaema," as the illustrations reproduced in the *Bulletin* (vol. 18, pp. 103 and 104) very strikingly show. Their arrival in the proboscis would seem to be a fortuitous incident in their almost body-wide distribution, and taken in conjunction with the failure, just noted, of gametes to develop at all into sporocysts, to indicate that the chances against a mosquito, which has actually imbibed gametocytes, infecting a second individual may be more considerable than has been suspected. MÜHLENS suggests that the question of the survival of sporozoits in the scutellum, muscles and palpi of hibernating mosquitoes is one requiring further investigation. WENYON finds that if infected mosquitoes be exposed to severe cold their oocysts degenerate. If the cold to which they are exposed be moderate development ceases, to be resumed when the temperature rises. There remains, then, the possibility that under certain conditions malarial parasites may hibernate in the mosquito. There seems little question, however, but that ordinarily they "hibernate" in man.

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* Where WENYON is quoted without reference to the *Bulletin* the originals will be found in the *Jl. Royal Army Med. Corps.*, 1921, vol. 37, nos. 3, 4 & 5.

The contraction of malaria in "uninhabited forests" raises the question whether those species of malarial parasites which medical men are prone to think of as man's especial dependents are not more promiscuous in their tastes. DONOVAN (vol. 17, p. 146) investigated this point in forests near Ootacamund, Madras. He found none of the human plasmodia in 76 *Macacus sinicus* nor in 10 *Presbytis priamus*. He detected a parasite very like *P. vivax* in *Ratufa indica malabarica*, the Malabar squirrel, and notes that MANSON has suggested that cave-dwelling bats may have been the original source of human malaria; in which connection it may be noted that RODHAIN and VAN DEN BRANDEN (vol. 11, p. 33) failed to infect with *P. falciparum* and *P. malariae* flying foxes of the species *Cynonycteris straminea*. What DONOVAN did find in these supposedly man-free forests were jungle folk heavily infected with malarial parasites. MESNIL and ROUBAUD (vol. 11, p. 32 and vol. 17, p. 146) have succeeded in infecting chimpanzees both with benign and with malignant tertian malaria by direct inoculation, but not through the intermediation of *A. maculipennis*. Both infections died out shortly and naturally. REICHENOW (vol. 17, p. 146) believes that he has found in the gorilla and chimpanzee in West Africa all the forms of plasmodia which infect man; but his own observations raise considerable doubt as to the correctness of his identifications.

Symptoms.

If there be excluded the proof by ACTON and KNOWLES that the specific gravity of the blood is lowered in malaria—a condition which, O'CONNELL suggests (vol. 15, p. 241), should govern the permission to malarial subjects to return to the tropics—and the recent evidence by CASTELLANI and WILLMORE (vol. 18, p. 333) that glycosuria may be malarial in origin, then there is little to note under this head. That as the result of the administration of quinine there may be no symptoms, although the blood is manifestly infected, is well recognized; that this may occur naturally is less authenticated. Unfortunately reports do not always make it clear whether such a condition is natural or quinine-induced; but in any case the following facts are striking.

During the examination of 31,000 persons in Bolivar county (vol. 15, p. 135) BASS found that about 16 per cent. of those who denied present or recent clinical evidence of malaria were infected. GHIRON noted the same thing on his own person for six weeks at Vallona (vol. 15, p. 398) and in 50 per cent. of sailors whom he examined. The effect of quinine in suppressing symptoms and in thus producing many carriers, and, incidentally from the purely sanitary point of view, keeping many men in the fighting line who would otherwise have been out of it, is insisted upon by ZONDEK (vol. 15, p. 97) in Roumania; by WENYON (vol. 18, p. 326) in Macedonia, who found that in 3,000 men who had had symptoms there were 25 per cent. of carriers; and by CHRISTOPHERS and SHORTT in Mesopotamia (*l.c.* p. 325), who estimated, from the examination of 3,500 men working with their units, that on any one day there were in that expeditionary force 9,000 military carriers and fewer than 60 malarial patients.

Traumatic rupture of the spleen inspires several recent papers, HENNESSY (vol. 17, p. 297) bringing the number of his operations for this condition up to 19. He stresses the frequency with which hypogastric pain and urinary irritation simulate a ruptured bladder, and the deceptive quiescent interval between the injury and the onset of restlessness, abdominal discomfort and an increasing pulse rate. Four cases of spontaneous rupture have been recently reported. Two are by SHEAF (vol. 16, p. 340), one an English soldier in hospital in Macedonia, who had recently experienced a rough journey; the other a Russian, the accident apparently occurring while he was sitting up in bed. SKEVINGTON (*ibid.*) reports rupture in a man of 25 while he was wheeling a barrow, and INGRAM (vol. 18, p. 101) the case of a Kroo boy who died in his sleep. A fairly complete list of the literature has been collected by LEIGHTON (*l.c.* p. 334).

The danger of abortion from foetal death, greater, in his opinion, as in that of others, than is the risk from quinine administration, is emphasized by ACTON (vol. 17, p. 306), and it may well be that this condition is not due merely to high temperature, as ACTON suggests, but to active malaria in the foetus, several instances of which have been reported recently. There is no real evidence that when a positive Wassermann reaction accompanies malaria it is not due to syphilis.

Treatment.

The main curative interest, despite its imperfections and the disrepute into which it fell in Macedonia, rests with quinine, and there seems little doubt that we are reaching a better appreciation of its limitations, and so of its value. In attempting to estimate the value of different lines of treatment, one is confronted with the difficulty of determining the sense in which the word " cure " is used, whether in that of clinical betterment irrespective of subsequent relapse, or of complete disinfestation. The unfortunate looseness with which the term is used is not always avoidable, for in places where infection is acquirable there exists the doubt as to whether a fresh manifestation is due to relapse or to a new infection. GRASSI and the French in Macedonia have courageously decided that they can distinguish between the two. The British in Macedonia, as WENYON notes, had to acknowledge that they found any such attempt futile ; and it is difficult to understand, bearing in mind the evidence collected above, how any other attitude can reasonably be adopted.

There is indeed only one way of estimating the value for disinfestation of any particular line of treatment, and that is to apply it, as was done in Dagshai, in a place where the possibility of reinfection may be disregarded. The Dagshai work emphasized several striking facts. Firstly, with the rarest exception and at all seasons of the year, relapses which occurred there were caused by the benign tertian parasite, although about half the men concerned (all soldiers diagnosed by the microscope and all treated by quinine previous to arrival) were by their history-sheets cases of malignant tertian malaria. The matter could not be dismissed as one of mistaken diagnosis, seeing that the statement held equally true for those in whom crescents were recorded in the sheets as having been present, and these are uncommonly characteristic bodies. The explanation given is that it is a mistake to speak of quinine as a specific for all malarias ; it had cured the malignant but not the benign cases, so that it should be regarded as a specific for malignant but not for benign tertian malaria. Quartan malaria was absent from the series. This view is strongly corroborated. CLARKE (vol. 16, p. 311) identified *Plasmodium vivax* alone in the blood of men who had previously served in Macedonia. PRATT-JOHNSON, GILCHRIST and HAY-MICHEL (vol. 17, p. 302) state that in German East Africa benign tertian infestations were more prone to relapse, malignant tertian more difficult to control but, having been controlled, less prone to relapse. WENYON'S extensive experience has led him to the same conclusions.

These considerations apply to the asexual phase, and to that only. Regarding gametocytes, work summarized by MAYNE (vol. 16, p. 310) points in exactly the opposite direction. It suggests that the giving of quinine to gametocyte carriers prevents subsequent development in mosquitoes of *P. vivax*, but not of *P. falciparum*, and it carries the corollary, if one correlate it with the Dagshai work, that, given to an individual with mixed tertian infections, quinine will probably destroy his malignant parasites, but that so long as the gametocytes persist he will be capable of spreading the infection and constitutes a danger to others. At the same time, although it will probably not cure his benign infection, it will, so long as he takes it, emasculate his benign gametocytes, so that there is no risk of his passing this infection on to others. WENYON has just published identical conclusions independently reached.

The second fact emphasized at Dagshai is that disinfestation must be looked upon as a fractional process. For instance, each eight-weeks' course of 30 gr. of quinine daily cures about 25 per cent. of those remaining infected with benign tertian parasites, at which rate 16 courses would be required to disinfest (within a minute fraction of 100 per cent.) all those affected. Such few malignant tertian relapses as occurred suggested that each course would cure 90 per cent. of those infected. The same principle is accepted by Ross (vol. 18, p. 338) in upholding the Single Dose Reduction Rate, which implies that a single dose of quinine will in general reduce the parasites by a definite number or a definite fraction. On this view, then, one cannot expect certain cure from any one course of quinine, the average number of courses depending, other things being equal, on the species of parasite concerned. The dosage and route of administration of quinine have been strenuously canvassed. Some, without adequate grasp of the enormous scope of the problem, advocate normal routes other than the oral. At Dagshai it was found that an intravenous followed by an oral course of quinine resulted in more relapses than did any other line of treatment. Its rapid clinical effect, which it may be essential to utilize, is undisputed. Intramuscular injections of quinine have insistent partizans and violent foes. Assuredly every such injection produces surrounding necrosis, which, if involving a nerve, has disastrous effects (vol. 15, p. 119). To some, injections give little discomfort; others emphatically refuse a second experience. Some believe that they permit rapid absorption of quinine; others report that the drug can be recovered from the necrotic area days after its administration. If adopted, this should be done with full realization of the accompanying circumstances.

Oral administration must remain the normal route. Regarding dosage, it is agreed generally that large doses do not give such good results as do moderate ones, and that the course should run to eight or twelve weeks. The "standard treatment" of the United States, ably advocated by BASS (vol. 18, p. 97, etc.), consists of 30 gr. of the sulphate daily for the period of symptoms, and thereafter 10 gr. daily for eight weeks. It is claimed that this gives 90 per cent. of cures; whether with any particular species of parasite or not does not appear to be stated. Ross considers 10 gr. daily for twelve weeks sufficient to cure most cases. ACTON's best results were got with 30 gr. daily for eight weeks. Quinine sulphate is not, however, ACTON's drug of election. He stated some eighteen months ago (vol. 16, p. 330) that the cure rate of benign tertian malaria with cinchonine was 40 per cent., with cinchona febrifuge (that is the total alkaloids of cinchona) 50 per cent., with cinchonidine and quinidine 60 per cent. It is only regarding cinchona febrifuge, however, that particulars have as yet been published, and, according to them, in doses of 21 gr. daily for ten days it is as effective as and far pleasanter to take than a four-months' course of quinine, at one-twentieth of the cost. In this he largely confirms the experience of PRAIN and WATERS; and addition to the experimental figures is to be expected. He has also recommended hydroquinine for malignant tertian malaria (vol. 16, p. 353). Publication of the requisite details regarding this important matter is long overdue.

Other than the cinchona derivatives, the most promising drug recently advocated is an infusion from the leaves or bark of *Vitex peduncularis*. VAUGHAN, from Ranchi, India, has given it a balanced advocacy, admirably restrained in view of the striking results he has obtained with it, both in malaria and blackwater fever, using daily 10 oz. of infusion, which represents ⅛-oz. of leaf.

Of other drugs tartar emetic was shown by GREIG (vol. 10, p. 167) to be ineffective, since malarial relapse occurred while it was being given for Oriental sore. The salvarsans have been constantly reported as actually inducing malarial relapses and causing ocular complications, acute asthma and exfoliative dermatitis; but are advocated as adjuvants to quinine, particularly in cachectic cases. MURRAY (vol. 17, p. 142) prefers cacodylate of soda as an arsenical adjuvant. Urotropine has proved ineffective. Mercury is advocated by CREMONESE (vol. 15, p. 126), who attributes to the effect of this metal his experience that syphilitics constantly escape malaria. WILLIS has his own especial remedy—effective, he tells us, in every case for sixteen years (vol. 11, p. 30).

If quinine be in some disfavour, it has still no serious rival. How does it act? MORGENROTH (vol. 13, p. .81) and SCHILLING and BOECKER (vol. 15, p. 128) have determined that quinine exists in greater quantity in the erythrocytes than in the plasma. LIPKIN (vol. 15, p. 128) finds that quinine rapidly leaves the blood for the tissues and, working with RAMSDEN (vol. 12, p. 342), discovered that the quinine content of the blood in chronic malaria is lower than in normal persons ingesting the same quantity. He puts the alternative queries, apparently still unanswered: Has the malaria become chronic because the quinine content of the blood has always been low, or has the content become low as the malaria became chronic? Ross believes that "quinine resistance" results from panicky excretion of quinine by the organism and not from the development of any particular strain of parasite. Proof that such a strain could develop seems, however, to lie in experiments by the brothers SERGENT with the allied *Proteosoma relictum.* Here resistance to quinine did appear in one of many canaries experimented upon, and was transmitted unmodified through two more, and to a modified degree through a fourth bird.

It does not seem, however, that undue excretion of quinine or the establishment of quinine-resistant strains can by themselves explain such failure of quinine therapy as occurred in Macedonia. There, as WENYON has pointed out, the carriers numbered 25 per cent. of the troops, mosquitoes were numerous, and of those found in tents in the morning 70 per cent. had fed at night. Accordingly one may fairly safely visualize the unfortunate individual as collecting infections by the score, and the unhappy medical man as trying to treat in any individual patient not one or even two separate infections, but a constantly recurring series of them. Amongst this rain of sporozoits those more resistant to quinine will survive and transmit the peculiarity through their gametes to the next asexual generation, and it will thus be passed on to other victims. With frequent transmission, such as occurred in Macedonia, a quinine-resistant strain might rapidly be induced. Assumption, of course, in part, but with that touch of reasonable imagination which will probably lead onwards and not into a cul-de-sac. It has been abundantly demonstrated, for instance, in German East Africa (vol. 17, p. 294), that starved, overworked malarial cachectics will not recover, with or without quinine, unless removed to a climate fit for heroes to dwell in.

The Seasonal Variations of the Malarias.

As WENYON points out, the various factors already mentioned co-ordinate themselves into an explanation of the seasonal variations of the malarias much more reasonable than the unzoological suggestion of mutability of form.

Owing to the resistance to quinine of the asexual phase of the benign tertian parasite and the general cessation of quinine ingestion during the winter, the year starts, north of the equator, with many more active carriers of *Plasmodium vivax* than of *P. falciparum.* Mosquitoes become correspondingly infected. As symptoms appear and quinine is again ingested the gametocytes of *P. vivax* are rendered impotent, while those of *P. falciparum* are not. Then, too, the latter tend, in heavy infections, to be more numerous than the former. Consequently mosquitoes steadily become more highly infected with malignant tertian malaria and transmit it in increasing degree, so that by autumn it is the prevalent infection.

In this connexion evidence is clearly required as to whether natural disinfestation in cases of infection with *P. falciparum* takes place more readily than when the infection is with *P. vivax.* Owing to a certain risk involved, this may not be too easy to obtain.

Immunity.

Regarding immunity there is, as Ross points out, great confusion. Tolerance of infestation without evident symptoms brands the carrier. It implies adequate compensation against ill-effects, not immunity. True immunity, or proteosoma-proofness, has been in part attained experimentally by the brothers SERGENT (vol. 18, p. 96). They found that the normal immunity rate in nearly 1,000 canaries was 0·72 per cent. This can be increased to 21 per cent. by injecting blood taken from a canary during the incubation period after an experimental infection ; and to about 30 per cent. by the injection of sporozoits which had been kept *in vitro* for twelve to forty-eight hours. These very suggestive experiments will doubtless be amplified and applied to the malarial parasites.

Prophylaxis.

The main preoccupation of prophylaxis, the destruction of mosquitoes, usually in the larval stage, or their enticement to grosser food than man, has been considered by ALCOCK in the review on Medical Zoology (vol. 18, p. 1). It may be added that WICKLIFFE ROSE (vol. 15, p. 131) notes that good results from larvicidal measures were obtained in Ismailia at an initial cost per head of 4*s*. 2*d*. and a recurrent annual cost of 1*s*. 8*d*., while in Port Said the corresponding cost was only 5*d*. Again, at Crosett, south-east Arkansas, physicians' calls were reduced from 2,500 to 7 annually at initial and recurrent costs of 5*s*. 2*d*. and 2*s*. 2½*d*. ; while at Hamburg, near Crosett, the corresponding figures were 2,312, 59, 6*s*. 0½*d*. and 1*s*. 10*d*. Screening produced in certain cotton plantations a 70·6 per cent. reduction in malaria, at an annual cost of 7*s*. 3½*d*.. FERRELL estimated (vol. 16, p. 351) that control operations during 1920 would extend to 60 or 70 counties in the southern United States, at a cost of nearly half a million dollars. In five years' previous work the *per capita* cost had varied from a quarter of a dollar to nearly a dollar and a half, while the consequent percentage reduction in malaria was estimated as from 72 to 97. A plaint from California reveals that taxation under the Mosquito Abatement District Act amounted to 4½*d*., as against an expenditure of £10, per acre. Indeed as antilarval measures emerge from the experimental stage the financial aspect looms larger. The expenditure is comparatively easy to estimate for any particular scheme. On the credit side it is pointed out that a community should take into consideration the probable saving of medical fees and the probable extra wages earned after its expected freedom from malaria.

Moreover an economical campaign against mosquitoes will restrict itself to those species proved to be local definitive hosts. MAYNE (vol. 15, p. 93) further suggests that it should, for the major part, be limited to the annual period during which these mosquitoes are infective.

This period may either be determined by actual microscopic tests, or inferred from a consideration of the conditions essential for the development of the malarial parasites in mosquitoes. GILL, for example (vol. 18, p. 328), has shown that epidemiological evidence exists that below a mean monthly temperature of 61° F. and mean monthly humidity of 63 per cent. malaria is not transmitted. HODGSON is apparently collecting experimental evidence on this matter. The area which antilarval measures must cover will, in view of recent observations indicating that the flight range of mosquitoes may extend to several miles, be determined in future more by what is financially feasible than by what is theoretically desirable.

It is clear that the war has provided experiences which have greatly advanced our knowledge on the malarias. Yet this advance has but indicated directions in which fuller knowledge is urgently required. Could the zeal with which the subject is attacked be always directed into the channels where it is most required, the advance would be much more rapid, and, incidentally, the task of the reviewer of the literature less disappointing.

MEDICAL ZOOLOGY.

ACTON (Hugh W.). **On the Behaviour of** *Paramecium caudatum* **towards the Cinchona Alkaloids.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 339–358. With 1 plate.

This is a very technically-expressed paper, the author evidently being—and the inference is intended as a mark of respect—a rigorous Hobbesian. It, therefore, does not lend itself to abstraction. All that can be done here is to set down some of the lessons and conclusions.

Working with a defined strain of paramoecium, variations—quite apart from those of an individual kind—in its resistance to intoxication by alkaloids of several definite strengths were found to occur, and to be due to alteration in the hydrogen ion concentration of the medium, this concentration, again, being found to vary in the main with the presence or absence of CO_2 in the medium. In other words, the amount of alkaloid necessary to kill the paramoecia is very considerably determined by the hydrogen ion concentration of the medium wherein they are living.

Paramoecia can always be cultivated from sublethal doses, but in lethal concentrations their survival depends largely on the hydrogen ion concentration of the medium. The alkaloids were found to be toxic to paramoecium in the following order :—ethyl-hydrocupreidine, ethyl-hydrocupreine (optochin), quinidine, cinchonidine, quinine, cinchonine.

Premising that what holds good for paramoecium in acid and alkaline media cannot be straightway applied to malaria parasites in the blood, the author opens out an interesting discussion on the application of these results to the treatment of malarial fevers by quinine and other cinchona alkaloids. Obviously two prime questions have to be settled by observation and experiment, namely, (1) whether it is the concentration of the alkaloid or the hydrogen ion concentration of the blood that determines the toxic effect of (*e.g.*) quinine on malaria parasites ; and (2) the question of the accessibility of the parasites, since (*e.g.*) quinine circulates in the blood as a base, and as such probably does not penetrate the erythrocyte membrane.

A. Alcock.

OEHLER (R.). **Die Phagocytose der Amöben und Ciliaten verglichen mit der Phagocytose der Leukocyten.** [The Phagocytosis of Amoebae and Ciliates compared with the Phagocytosis of Leucocytes.]—*Mediz. Klinik.* 1921. Apr. 17. Vol. 17. No. 16. pp. 475–476.

From certain experiments the author infers that there is a far-reaching difference between metazoan phagocytosis and the mechanism of nutrition in bacteria-eating protozoa. The nutrition of phagocytes is osmotic, bacteria, etc., are not a necessary element of food : but bacteria-eating protozoa, however, cannot live by osmosis alone, bacteria are a necessary of life. Bacteria still living can be taken from phagocytes ; but so far as we know, bacteria are quickly digested and got rid of by protozoa. Though protozoa may ingest pathogenic and non-pathogenic bacteria indifferently, they show likes and dislikes for other properties of bacteria.

A. A.

HOGUE (Mary Jane). **The Cultivation of** *Trichomonas hominis.*—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 211–214.

1. To a thoroughly beaten fowl's egg, 200 cc. of Locke solution (sodium chloride 0·9 gm., calcium chloride 0·024 gm., potassium chloride 0·042 gm., sodium carbonate 0·02 gm., dextrose 0·25 gm., distilled water 100 cc.) is added; the mixture is heated, in constant motion, over a hot-water bath for fifteen minutes, and then filtered through cotton-wool with a suction pump. Test-tubes are charged with 6 cc. of the filtrate and autoclaved under 15 lb. pressure for twenty minutes, and are ready for inoculation. Trichomonas cultivated in this medium appeared in greatest numbers on the second day, and rarely lived longer than six days.

2. To the thoroughly beaten whites of two eggs 200 cc. of a 0·7 per cent. salt solution are added; the mixture is cooked, as before, for half an hour, then filtered, tubed, and autoclaved, as before. Trichomonas cultivated in this medium were most numerous on the third day, and lived for six to ten, or even eleven days. With a few drops of sheep serum or human serum added the organisms throve even better, though they did not last so long.

The organisms did not encyst in any of the cultures; they became vacuolous and went to pieces.

A. A.

AKATSU (Seinai). **On the Cultivation of** *Tetratrichomonas hominis.*—*Kyoto Igaku Zassi.* 1921. Aug. Vol. 18. No. 7. [In Japanese, pp. 65–72. With 2 plates. English summary, p. 71.]

The author used clotted ascitic fluid, inoculating with a capillary pipette containing a small amount of dental tartar. Some remarkable forms are figured.

A. A.

HOGUE (Mary Jane). *Waskia intestinalis*: **Its Cultivation and Cyst Formation.**—*Jl. Amer. Med. Assoc.* 1921. July 9. Vol. 77. No. 2. pp. 112–113. With 2 text figs.

The author describes and figures *Waskia intestinalis* in its free and encysted forms, from cultivated specimens derived from the stool of a native of the United States having a history of diarrhoea persistent for many years. She also describes the media—ovomucoid, Locke egg, and ox-bile salt—in which the organism was successfully cultivated.

A. A.

PAEZ (Felix R.). **Un caso de infeccion doble por Anquilostomos y Lamblias.**—*Gac. Med. de Ciudad Bolivar.* 1919. Sept. No. 62. pp. 32–36.

A brief account of a fatal case of inveterate diarrhoea with extreme anaemia and prostration in a deaf-mute boy of eight years of age. Examination of the mucous dejecta revealed numerous *Lamblia intestinalis* and eggs of *Ancylostoma duodenale*. The author states that it is the first case of Lamblia infection he has met with in Ciudad Bolivar. The remainder of the article is a summary of the present state of knowledge concerning the life-history, etc., of Lamblia.

F. S. Arnold.

ZOTTA (G.). **Sur la transmission expérimentale du** *Leptomonas pyrrhocoris* **Z., chez des insectes divers.**—*C.R. Soc. Biol.* 1921. June 25. Vol. 85. No. 23. pp. 135–137.

This investigator has, by inoculation into the body-cavity, infected various Hemiptera, coleopterous and lepidopterous larvae, and Diptera with *Leptomonas pyrrhocoris*, but has failed to infect the water-beetle *Hydrophilus piceus*, and the Phasmid, *Carausius morosus*. The infection elicits a profusion of gigantic phagocytes.

The mealworm and the caterpillar of the bee-moth are terribly susceptible; in the latter the infection, which is prodigious, spreads to the wall and lumen of the gut, and generally proves mortal.

A. A.

SERGENT (Et. & Ed.). **Formes leishmaniennes et leptomonadiennes chez les punaises de chauves-souris.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 413–415. With 1 text fig.

CHATTON and COURRIER, having lately observed, in Alsace, a bat-trypanosome with a development something like that of *Schizotrypanum cruzi*, have suggested the possibility of bats being a reservoir of the virus of goitre, from which Diptera having aquatic larvae may carry infection. But the present authors described the said bat-trypanosome sixteen years ago and noticed their frequency in Algiers. They now figure leptomonas and leishmania forms found (at Debrousseville in Algiers) in one of the bat bugs (*Cimex pipistrelli*) and hint at a possible genetic connexion between these and the trypanosome.

At the time when they made a survey of the endemicity of goitre in Algiers they found that goitre is unknown in the great plain of Habra, of which Debrousseville occupies the centre.

A. A.

i. HAUGHWOUT (Frank G.). **A Case of Human Coccidiosis detected in the Philippine Islands, with Remarks on the Development and Vitality of the Cysts of** *Isospora hominis* **(Rivolta).**—*Philippine Jl. Sci.* 1921. Apr. Vol. 18. No. 4. pp. 449–482. With 3 plates, 1 folding map and 1 text fig.

ii. **Coccidiosis in Man as a Possible Sanitary Problem in the United States.**—*Jl. Amer. Med. Assoc.* 1921. Sept. 17. Vol. 77. No. 12. pp. 940–941.

i. This well-analysed case forms the text of a long and interesting study of the subject of human coccidiosis.

The case itself is that of an American chemist, aged 32, who had travelled fairly widely, and in the course of his work had come in contact with workmen from many parts.

The clinical symptoms were anorexia, lassitude, occasional nausea, and occasional watery diarrhoea; there was no pain or griping, nothing but a dull feeling of discomfort in the abdomen. The stools were always faeculent, and they did not contain anything pathological except shed epithelial cells and oocysts of *Isospora hominis*. (Blastocystis was also present.) The patient was under observation for more than four months, and was still infected when he left the author.

The development of the oocysts is described in detail, and epidemiology, pathogeny, treatment, etc., are discussed, though nothing new is added.

The physical resistance of the cysts outside the body was experimentally tested by exposing faeces containing cysts that had not got beyond the sporoblast stage to the hot March Manila sun for three hours of the forenoon during seven consecutive days. On being restored to moisture at the end of the week some of the cysts resumed development, and ultimately showed sporozoites, which from their colour and general appearance were judged to be alive.

A list of 18 papers is appended.

ii. The above case is here reported in less detail.

A. A.

HAUGHWOUT (Frank G.). **Note on a Case of Human Infection with** *Isospora hominis* **probably originating in the United States.**—*Jl. Parasit.* 1921. Sept. Vol. 8. No. 1. pp. 45–46.

Attention is directed to this case and to eleven other cases detected in the United States since 1918, in relation to the number of coccidiosis infections observed in troops in and returned from the Eastern Mediterranean area.

A. A.

SERGENT (Etienne). **Le diagnostic de l'infection latente dans le paludisme des oiseaux.** (*Plasmodium relictum.*)—*C.R. Soc. Biol.* 1920. July 17. Vol. 83. No. 25. pp. 1063–1064.

With bird malaria (Proteosoma), as with human malaria, the microscope alone is not sufficient to decide the expiry of infection. The persistence of a Proteosoma infection not discernible by the microscope may be elicited by the following experimental test methods: (1) complete indifference to a fresh infection—the surest test; (2) persistent infectivity of the blood when injected into clean birds of the same species; (3) persistent infectivity of the blood to *Culex*—a precarious test [and obviously so, if unconditioned]; (4) liability to relapse on particular provocation, by heat (twelve hours at 37° C.), cold (three consecutive days below 0° C.), cold douche, or injection of alien blood (human or rat)—an even more precarious test. After death, hypertrophy of the spleen is a sure sign of persistent infection.

A. A.

SINTON (J. A.). **Infection with** *Nuttallia ninense* **among Hedgehogs in the North-West Frontier Province, India.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 359–363. With 2 coloured plates.

The parasite, which is almost certainly YAKIMOFF'S *Piroplasma ninense* originally discovered in the European hedgehog, is here very fully described and figured.

A. A.

BOËZ (L.). **Schizogonie et lésions pulmonaires dans un cas de toxoplasmose spontanée du chien.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 479–482. With 1 text fig.

Of this toxoplasmosis of the dog only six cases have been observed, and two of them seem to be doubtful. In the case here reported the characteristic features were the extensive riddling of the lungs with small whitish nodules, from a pin-head to a pea in bigness, and the normal condition of the spleen and all the other viscera, though the glands of the hilum of the lung were enlarged.

In smears of the lungs numerous toxoplasmata were seen—little crescents 3μ to 6μ long, sometimes dividing by longitudinal fission, sometimes multiplying by schizogony.

Two dogs inoculated, one subcutaneously, the other intraperitoneally, with the pulp of a nodule from the lung showed no effects up to a year afterwards.

A. A.

i. PHISALIX & TEJERA (E.). Sur une hémogrégarine et ses kystes de multiplication chez un lézard Iguanidé. *Tropidurus torquatus*, Wied.—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. 783–785.

ii. HOARE (Cecil A.). On Some New Hemogregarines from British East Africa.—*Parasitology.* 1920. Dec. Vol. 12. No. 4. pp. 315–327. With 1 plate.

iii. STAMMERS (G. E. F.). Haemogregarines in Black Rats.—*Jl. Trop. Med. & Hyg.* 1920. Dec. 15. Vol. 23. No. 24. pp. 298–299. With 3 text figs.

iv. LEGER (A. & M.). Hémogrégarine d'un poisson marin (*Diagramma mediterraneum*).—*C.R. Soc. Biol.* 1920. Oct. 16. Vol. 83. No. 28. pp. 1275–1277.

v. DELANOË (P.). Au sujet d'*Haemogregarina Brendae*, Sambon et Seligmann.—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 451–453. With 1 text fig.

vi. SERGENT (Étienne). Hémogrégarine (Hepatozoon) de l'écureuil de Gétulie.—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 56.

i. A purely descriptive paper of the several forms of a haemogregarine found in a species of lizard.

ii. Descriptions of haemogregarines from two snakes and two toads. From one of the toads some small spore-like bodies are figured, which are said sometimes to occur in pairs or in fours-in-a-row.

iii. A note of the occurrence of a haemogregarine in black rats out of a ship from Sweden in the port of London.

iv. Description of a new species, *Haemogregarina dakarensis*, from a pristipomatid fish, *Diagramma mediterraneum*. A list of 28 piscine haemogregarines, with their respective hosts, is given, with the caution that some of them may prove to be synonyms.

v. A description, with some figures, of forms observed in abundance in blood taken from the heart of *Psammophis sibilans*.

vi. A short note on a new species of Haemogregarine, *Hepatozoon gaetulum*, found in abundance in the uninuclear leucocytes of squirrels (*Atlantoxerus gaetulus*) from the Libyan Sahara.

A. A.

i. KUDO (R.). On some Protozoa parasitic in Fresh-Water Fishes of New York.—*Jl. Parasit.* 1921. Vol. 7. pp. 160–174. With 4 text figs.

ii. ROMERO SIERRA (J. M.). Estudio y clasificacion de un ascaris. Contribucion al estudio de la parasitológia en Venezuela.—13 pp. With 1 plate. 1921. Caracas.

iii. GALLI-VALERIO (B.). Parasitologische Untersuchungen und Beiträge zur parasitologischen Technik.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. June 11. Vol. 86. No. 4. pp. 346–352.

i. Two new species of Myxosporidia, namely, *Wardia lucii* and *Myxidium moxostomatis*, parasitic in *Lucius reticulatus* and *Moxostoma* sp., are described and figured. *Myxidium lieberkühni*, Bütschli, and *Trypanosoma remaki*, Lav. and Mesnil, are also figured, with a commentary.

ii. This seems to be a short essay based on extracts from a laboratory notebook; it contains nothing novel or important.

iii. This is a hotch-potch from which many facts of more or less use may be picked. It ranges from yeasts and bacteria to worms and Arthropoda, and touches on their geographical distribution, their hosts, and other sundries. There are also a few remarks on stains and on a field microscope.

A. A.

SERGENT (Edm.). **Sur l'hypothèse de l'évolution des** *Sarcocystis* **du boeuf chez un insecte hématophage, hôte définitif.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 408–411.

In a drop of blood taken from the dewlap of a calf the author found a good number of spores resembling those of *Sarcocystis blanchardi.* Two distinct kinds of spores were observed—one smaller, the cytoplasm staining a deep blue, the chromatin compact and staining uniformly dull red; the other larger and more oval, the cytoplasm staining a pale rose or mauve or bluish-green, the chromatin mass smaller and not staining so uniformly nor so well defined; in two fields a pair of these different kinds were seen coupled end-on.

The author considers the argument for and against the spores having been present in the blood itself and not in the tissues pricked; for the two different kinds being male and female; and for its bearing on the different hypotheses of the relation of Sarcocystis to blood-sucking insects.

A. A.

i. KUDO (R.). **Studies on Microsporidia, with Special Reference to those Parasitic in Mosquitoes.**—Reprinted from *Jl. of Morphol.* 1921. Mar. Vol. 35. No. 1. pp. 153–193. With 5 plates and 1 text fig.

ii. ——. **On the Structure of Some Microsporidian Spores.**—*Jl. Parasit.* 1920. June. Vol. 6. pp. 178–182. With 1 text fig.

iii. ——. **Cnidosporidia in the Vicinity of Urbana.**—Reprinted from *Trans. Illinois State Acad. Sci.* 1920. Vol. 13. pp. 298–303.

i. After a review of the subject the author describes *Thelohania magna* from the adipose tissue of the larva of *Culex pipiens,* and *T. illinoisensis* from that of the larva of *Anopheles punctipennis,* also *Nosema baetis* from the nymph of a species of *Baetis*—all three being new species. Heavy infection with *T. magna* seems to be fatal to the host, and the author suggests a practical application of this fact.

ii. The spore of *Thelohania magna* being particularly large (12–13·5μ long), is here described and figured; it has a distinct polar capsule, and a spiral filament without a central axis; the sporoplasm is rounded, and contains a single nucleus.

iii. Fishes in this part of Illinois are heavily infected with Myxosporidia; a list of species and hosts is here recorded. Microsporidia also are common among some of the aquatic insects.

A. A.

KUDO (R.). **On the Nature of Structures Characteristic of Cnidosporidian Spores.**—Reprinted from *Trans. Amer. Microscopical Soc.* 1921. Apr. Vol. 40. No. 2. pp. 59–74.

From the observations here recorded the author concludes (1) that the spore membrane of *Nosema apis* and *bombycis*—taken as representatives of the Microsporidia—is similar to chitin, and that of the

Myxosporidian *Henneguya salminicola* is less similar to chitin, in chemical reactions; (2) that the polar filaments of Cnidosporidian spores are "formed by the mixture of part of the nucleus and a substance differentiated in the capsulogenous cell"; and (3) that the iodinophilous vacuole of the spores of Myxobolidae contains a substance having chemical reactions similar to glycogen. Extrusion of the polar filament is elicited by pressure, and by solution of KHO or perhydrol.

A. A.

BARRET (Harvey P.) & YARBROUGH (Nancy). **A Method for the Cultivation of** *Balantidium coli*.—*Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 161–164.

For cultivation of *Balantidium coli* 0·5 per cent. salt solution is the proper tone, partial anaerobic conditions are favourable, and a temperature of 37°–38° C. appears to be the best.

The medium here used was a mixture of 1 part inactivated human blood serum and 16 parts of 0·5 per cent. salt solution. About 8 cc. of the medium is put into a narrow test-tube, and 0·1 cc. of pure faeces containing mucus is pipetted into the bottom of the tube, which is then incubated at 37° C.

Only moderate growth took place in the first 24 hours; 48 to 72 hours seemed to be the optimum. Moderate bacterial growth was favourable; excessive growth of bacteria was very unfavourable. Simple fission was commonly seen, encystment sometimes, and apparent conjugation once.

Subcultures were usually made every second day. A strain was kept up for 32 days, and only lapsed because after the eleventh transplantation subculture was delayed for five days, by which time the organisms had disappeared.

A. A.

MAXWELL (J. Preston). **Intestinal Parasitism in South Fukien.**—*China Med. Jl.* 1921. July. Vol. 35. No. 4. pp. 377–382.

By reason of the habitual use of human excreta in cultivation in China, the soil and water (which is not filtered for use) and crops (certain kinds of which are eaten raw or imperfectly cooked) are persistently polluted, and infection with intestinal parasites is naturally very common. The author mentions nine kinds of intestinal worms observed by himself, as well as *Entamoeba coli* and *histolytica* and *Balantidium coli*. From data obtained from 8,000 stools he calculates, by some method not explained, that of the general population of the southern half of the province of Fukien 78 per cent. have *Ascaris lumbricoides*, 11 per cent. *Trichuris trichiura*, and 11 per cent. *Ancylostoma duodenale* and *Necator americanus* combined.

Infection with Ancylostoma, Necator, and Ascaris is much less frequent among opium smokers than among others; this is to be explained, in the case of the two first, by the fact that opium smokers are too lazy to work in the (infected) fields; but in the case of Ascaris it is a simple unexplained fact.

Clonorchis sinensis and *Fasciolopsis buski* have not been observed in the area of the author's investigation.

A long list of intestinal parasites of the local domestic animals is given.

A. A.

SWELLENGREBEL (N. H.). **De Anophelinen van Nederlandsch Oost-Indië.**—*Koloniaal Instituut te Amsterdam. Mededeeling No. 15, Afdeeling Tropische Hygiene No. 10.* pp. x + 155. With 76 text figs. and 20 coloured plates.

This work on the Anophelines of the Netherlands East Indies can be confidently recommended both to students and to teachers. It gives a clear, succinct, and well-ordered account, illustrated both by coloured plates and by pointed and explicit text figures, of all the local species. Each species is critically described in its female, male, and larval forms, and also, as far as possible, in its biology, its breeding-grounds, and its pathogenic activities.

The introductory chapters contain an account, full in detail yet very simple and lucid in statement, of the external features and characters of the Anopheles type, and synoptic tables for the specific identification of males, females, and larvae.

In his systematic presentation of the subject the author recognizes Stethomyia, Myzorhynchus, Myzomyia, Neomyzomyia, Nyssorhynchus, etc., as distinct generic terms, and splits his Myzomyia species into two groups under *M. rossi* and *M. aconita* respectively.

A. A.

MARTINI (E.). **Die Tasterfrage bei den Stechmücken.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 10. pp. 295–301. With 3 text figs.

A discursive but interesting paper. The author concludes that the number of palp segments is of little value for determining the genetic relations of Culicidae. He also states that the genitalia of the male are very variable, but that the chaetotaxy of the larva is very constant.

A. A.

SENIOR-WHITE (R. A.). **A Survey of the Culicidae of a Rubber Estate.** —*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 304–325. With 3 plates, 1 text fig. and 1 folding chart.

This is a model paper, though the details, of course, are mainly of local interest. The survey was continued for one complete year. The topography of the estate is described, and breeding-places are mapped; the individual breeding-places are described and well figured, and their culicid fauna at different seasons is specified; and then the individual species are treated seriatim with reference to seasonal occurrence, breeding haunts, and any other noteworthy particulars. There are also tabulated summaries showing, among other things, the breeding-results month by month, the monthly breeding-totals of each species observed, the species associated in each different type of breeding-haunt, and the malaria relations. The only abundant malaria carrier of the area (a hilly tract of 1,000 to about 4,000 feet elevation in the Central Province of Ceylon) is *A. maculatus*, which breeds in every month of the year, and in every permanent water except the river (of the estate surveyed), though a larva was once discovered in water lodged in a coconut shell. *Stegomyia fasciata* was not observed, and is stated by the author to exist, probably, only at Colombo and Trincomalee.

During the survey a record was kept of Anophelines captured in the author's bungalow; none was taken in bedrooms; those taken were on windows of the verandah.

A. A.

FEDERATED MALAY STATES: **Malaria Bureau Reports.** 1920. Nov. Vol. 2. 47 pp. By H. P. HACKER, M.D., B.Sc. (Lond.), Medical Entomologist, Federated Malay States. 1921. Printed by Waterlow & Sons, Limited, London, Dunstable and Watford.

Nearly half this report is occupied with details of the author's statistical method of studying the specific inter-associations of Anopheles larvae. The number of times a particular species is found with each of the other species of the district are added all together and the association with each of those species expressed in percentage. It is not surprising to find that the practical results harmonize with those of ordinary observation.

Interesting observations were made of Anopheles larvae breeding in old tins, pottery, discarded utensils, and neglected water-tanks; twenty-seven instances were observed, and in all cases the various receptacles contained earth, leaves, weed, etc., and had therefore come to resemble a natural breeding-place.

In 46 wells examined Anopheles larvae were found only in two instances, and then in wells having no depth of water.

The last item of the report deals with an investigation of an outbreak of malaria on the banks of the Perak River in January, and as the result of minute and careful observations it was concluded that *A. ludlowi* was mainly responsible.

A. A.

WESENBERG-LUND (C.). **Les Anophélines du Danemark et les fièvres paludéennes.**—*C.R. Soc. Biol.* 1921. July 16. Vol. 85. No. 26. pp. 386–387.

In Denmark *Anopheles plumbeus* is rare, *A. bifurcatus* inhabits forest and bites after nightfall, and *A. maculipennis*, which is the dangerous species in respect of malaria, has, as a consequence of a revolution in the national methods of dairy and farm already considered by the author [this *Bulletin*, Vol. 18, p. 193], completely lost contact with man. Hence the malaria chain has been broken.

A. A.

LEGENDRE (J.) & OLIVEAU (A.). **Rôle du lapin domestique dans l'attraction et la nutrition d'***Anopheles maculipennis*.—*C.R. Acad. Sci.* 1921. Mar. 29. Vol. 172. No. 13. pp. 822–823.

These authors have observed that *Anopheles maculipennis* has a marked preference for the blood of the rabbit, and they think that this preference can be turned to good purpose in malarious districts. [Colonel S. P. JAMES has made the same observation in the island of Sheppey, and made the same suggestion last year in a lecture at the School of Tropical Medicine in London.]

A. A.

GORDON (R. Montgomery) & YOUNG (C. J.). **The Feeding Habits of** *Stegomyia calopus*, **Meigen.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 265–268.

MARCHOUX and SIMOND have stated that since *Stegomyia calopus* (= *fasciata*), after the first six or eight days of its existence, does not bite during the day, and since also a Stegomyia acquiring the infection of yellow fever does not become infective until at least twelve days afterwards, yellow fever cannot be contracted by man during the daytime.

The experiments here recorded show that Stegomyias under perfectly natural conditions will bite either by day or by night—certainly more than fourteen days after the first meal of their life.

A. A.

KONSULOFF (St.). **Die Lebensbedingungen der Anophelinen in Bulgarien in Zusammenhang mit der Malaria-Verbreitung.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 227–240. With 2 charts in text.

In Bulgaria unusually and persistently low spring temperatures check the number of Anopheles in the following summer. Spring rains have no effect on the summer numbers of *Anopheles maculipennis* and *sinensis*, but rain in July and August favours the increase of these species. The number of *A. superpictus*, however, depends on the amount of rain in the spring and early summer.

A. A.

CONNOR (M. E.). **Fish in Extermination of Mosquitoes.**—*Gac. Méd. de Mexico.* 1920. Aug.–Dec. Vol. 1. Ser. 4. No. 7. p. 543. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Oct. 1. Vol. 77. No. 14. p. 1139.]

Connor states that by means of fish 30,000 cisterns, etc., in Guayaquil were freed from mosquito larvae. The most useful local fish is the *chalaco*. The fishes are distributed from house to house by sanitary inspectors, whether larvae are living in the cisterns, etc., or not, and the people love their fishes, some families having kept the same fish for eighteen months.

A. A.

HILDEBRAND (Samuel F.). **Suggestions for a Broader Application of Gambusia for the Purpose of Mosquito Control in the South.**—*Public Health Rep.* 1921. June 24. Vol. 36. No. 25. pp. 1460–1461.

No one has any doubt that fishes are an efficient check on mosquitoes breeding in ponds and borrow-pits, particularly where the water is free of weed; and the author here advocates the employment of special measures for breeding, distributing, and advertizing Gambusia for this purpose.

A. A.

YOUNG (C. J.). **Natural Enemies of** *Stegomyia calopus*, **Meigen.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 301–312. With 2 text figs. and 2 plates.

An interesting experiment confirming the well-known fact that dragon-fly larvae and certain aquatic bugs are destructive to mosquito larvae. Adult dragon-flies also were observed to catch *Stegomyia calopus* (= *fasciata*) on the wing when they were given an opportunity of doing so under observation.

A. A.

CABALLERO (Arturo). **Las especies del género Chara y las larvas de los mosquitos.**—*Anales del Instituto General y Técnico de Valencia.* No. 10. pp. 5–17.

The author has extended his laboratory investigations into the field and has satisfied himself that three species of Chara, namely *C. foetida*, *C. contraria*, and *C. hispida*, possess the power of destroying mosquito larvae.

A. A.

ROUBAUD (E.). **Mode d'action du trioxyméthylène en poudre sur la larve d'anophèle.**—*C.R. Acad. Sci.* Paris. 1920. July 5. Vol. 171. No. 1. pp. 51–52.

The author's advocacy of trioxymethylene powder (paraform) as a larvicide specific to Anopheles has been noticed in this *Bulletin* (Vol. 17, p. 115). Here it is explained that the larvicidal power is exercised by the disengaged vapours, which are very quickly dissolved in the water, so that the larvicidal action, though potent, is transient; also that larvae can become immunized to the vapours, though the immunization also is transitory.

The condition of the Anopheles larva paralysed by trioxymethylene is curiously like that of the paralysed insects in the nursery-larders of the fossorial and solitary wasps, the Anopheles larva being not only mortally paralysed, but also wonderfully preserved against putrefaction.

A. A.

LAMBORN (W. A.). **A Protozoon Pathogenic to Mosquito Larvae.**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 213–215.

In a batch of 29 larvae of *Stegomyia scutellaris* found in an old pot in a Malay garden many were seen by naked eye to have white opalescent gills. Under the microscope the appearance was found to be due to crowds of Protozoa, which in some cases had invaded the general body-cavity as far as the head and antennae. These Protozoa were in active movement, and on escape they were seen to be flagellated. Their effect on the larvae was that the gills, some or all, became detached; and ultimately all the larvae died, most of them before pupation. Fresh larvae introduced at once into the infected water did not become infected, nor did larvae introduced successively for some time afterwards; but some larvae introduced nearly three months afterwards did become infected.

A. A.

KEILIN (D.). **On a New Ciliate:** *Lambornella stegomyiae*, **n. g., n. sp., Parasitic in the Body-Cavity of the Larvae of** *Stegomyia scutellaris* **Walker (Diptera, Nematocera, Culicidae).**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 216–224. With 6 figs. in text.

The protozoon observed by LAMBORN in the gills and body-cavity of the larva of *Stegomyia scutellaris* is here fully described and figured under the name of *Lambornella stegomyiae*, n. gen., n. sp. It is a holotrichous ciliate possessing a small mouth. It multiplies by transverse fission in the body-cavity of the insect, and finally escapes and becomes encysted. The author believes it to be the only known species of Ciliate parasitic in the body-cavity of an insect. He appends a list of Ciliates parasitic in other Arthropods.

A. A.

KEILIN (D.). **On a New Type of Fungus:** *Coelomomyces stegomyiae*, **n. g., n. sp., Parasitic in the Body-Cavity of the Larva of** *Stegomyia scutellaris* **Walker (Diptera, Nematocera, Culicidae).**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 225–234. With 7 figs. in text.

The free sporangia of this parasite were found in enormous numbers packing the tracheal gills and neighbouring segments of a larva of *S. scutellaris* from the Federated Malay States. In sections of the larva the mycelium was found ramifying in the walls of the midgut and beneath the hypoderm. The mycelium does not show any distinction of cells. The development of the sporangia, from terminal thickenings of the branches of the mycelium, is described as far as possible. The sporangia observed were of two kinds—thick-walled, which perhaps are resistant or resting forms, and thin-walled.

The systematic position of Coelomomyces is not quite clear; it would appear to belong to the Phycomycetes, and undoubtedly shows some resemblance to the Chytridineae.

A list of parasites of mosquito larvae recorded by different authors is appended; it includes species of fungi, bacteria, spirochaetes, gregarines, schizogregarines, microsporidia, flagellates, ciliates, and nematodes.

A. A.

i. KIEFFER (J. J.). Chironomides des Philippines et de Formose.—*Philippine Jl. Sci.* 1921. May. Vol. 18. No. 5. pp. 557–593.

ii. AUSTEN (E. E.). A Contribution to the Knowledge of the Blood-sucking Diptera of Palestine, other than Tabanidae.—*Bull. Entom. Res.* 1921. Sept. Vol. 12. Pt. 2. pp. 107–124. With 1 plate and 3 text figs.

iii. CARTER (Henry F.), INGRAM (A.) & MACFIE (J. W. S.). Observations on the Ceratopogonine Midges of the Gold Coast, with Descriptions of New Species. Part IV.—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 177–212. With 13 text figs.

iv. SALM (A. J.). Enkele nieuwe bloedzuigende insekten.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 1. pp. 58–64. With 2 plates.

v. STRONG (W. M.). Phlebotomus Flies in Papua. [Correspondence.]—*Med. Jl. Australia.* 1921. Sept. 3. 8th Year. Vol. 2. No. 10. p. 193.

vi. GALLI-VALERIO (B.). Beobachtungen ueber Culiciden.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Mar. 15. Vol. 86. No. 1. pp. 31–33.

vii. SWELLENGREBEL (N. H.). De mannelijke genitalien der Nederlandsch Indische Anophelinen.—*Tijdschr. v. Entomol.* 1921. Vol. 64. pp. 36–45. With 7 text figs.

viii. (*a*) MARTINI (E.). Anopheles in Niedersachen und die Malariagefahr. (Nach einem Vortrag auf der 86 Versammlung Deutscher Naturforscher und Aerzte.)—*Hygienische Rundschau.* 1920. Nov. 15. Vol. 30. No. 22. pp. 673–677.

(*b*) ——. Neuere, zur Beurteilung der Malaria- und Anopheles-verhältnisse in Deutschland wichtige Literatur. (Ergänzung zu meinem Aufsatze in No. 22 der "Hygienische Rundschau" S.673.)—*Ibid.* Dec. 15. Vol. 30. No. 24. pp. 737–742.

i. A systematic paper, including descriptions of 35 new species of Chironomidae.

ii. This paper includes descriptions of six new species of Culicoides and one new species of Simulium and Lipoptena severally.

iii. This paper contains a full account of the genus Dasyhelea, and detailed descriptions of twelve new species.

iv. Two new species of Ceratopogoninae, namely *Ceratopogon raphaelis* and *Culicoides esmoneti*, are described and figured, and merely some measurements of a third, *Culicoides javanicus*, are tabulated.

v. An undetermined species of Phlebotomus from Papua is mentioned.

vi. Miscellaneous observations made in the neighbourhood of Lausanne; nothing of general interest.

vii. The male genitalia of the Anophelines of the Netherlands Indies are described.

viii. (*a*) This paper is intended for local information. Its aim is to draw attention to the desirability of a proper knowledge of the distribution of Anopheles; so that, in view of any anxiety felt as to recrudescence of malaria through troops returning home from malarious countries, that knowledge can be utilized in choosing situations suitable for malaria sanatoria and avoiding situations where infection is likely to be spread by Anopheles.

(*b*) A list of 108 publications referring to the subject.

A. A.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part IV. Some Mesopotamian Nematocera of Economic Importance.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 245–252. With 1 plate.

Culicoides mesopotamiensis and *Tersesthes mesopotamiensis*, n. spp., are described and figured. Many individuals of different species of Culicoides were examined for flagellates, without success. Larvae and pupae may be destroyed extensively by clearing away weeds and decaying vegetation from the margin of streams and ponds.

Phlebotomus papatasii and *minutus* are found everywhere in Mesopotamia, the former, which is the commoner, being one of the most serious local insect pests. They appear to breed in crevices in the ground and to hibernate as larvae. The writer believes that the Herpetomonas parasite of these midges is responsible for oriental sore in Mesopotamia, passing through the skin when the insect is crushed in the act of biting.

The commonest local Anopheles is *A. pulcherrimus*, which abounds in all marshy tracts; it may bite by day. *A. stephensi* is common in and around Busra, and breeds in water-channels among the date palms. *A. sinensis*, *A. maculipennis*, and *A. lukisi* are other Mesopotamian species. *Aëdes calopus* (= *Stegomyia fasciata*) was observed in several places.

A. A.

KOBAYASHI (Harujiro). **Overwintering of Flies.**—*Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. 3. pp. 11–14.

The house-fly referred to in this paper is stated to be *Musca domestica*. In Corea house-flies are found in ordinary houses in the winter. House collections made between January 8th and March 1st yielded nearly 2,600 females and nearly 1,900 males. Some of the females of a collection made on the 12th January had mature ovaries and the spermathecae charged. Females captured in the winter sometimes deposited eggs in the laboratory.

The author kept several hundred females alive in test-tubes in the winter and spring (January to April and May) for over 100 (101 to 120) days, five or six up to several dozen flies being put into a single broad tube with moistened biscuit, and the tubes being kept in the laboratory where the temperature ranged between 5° and 18° C.

Eggs did not hatch in the open laboratory at these temperatures. Larvae of the third instar died when submitted to a temperature of —12·5° C. for 24 hours. Of full-grown larvae submitted to temperatures of —5° to —6·5° C. for a week, 25 per cent. lived, the rest died either before or after pupation. Pupae kept in the open laboratory (temperature ranging between 5° and 18° C.) hatched in a few weeks; pupae kept at —0·5° to —12·5° C. for a week died, but those kept at —12·5° C. for one day survived. Adult flies survived all the above stated temperature tests.

Stomoxys calcitrans, in the laboratory, deposited eggs in November, the issue of which pupated in February and March and reached the imago stage on April 23rd.

A. A.

SINTON (J. A.). **Some Cases of Myiasis in India and Persia, with a Description of the Larvae causing the Lesions.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 132–162. With 4 plates and 8 text figs.

This paper is full of careful descriptive detail, the larva of *Chrysomyia dux* in particular being described at very great length and—as also that of *Lucilia sericata*—very fully figured. Of the six cases of myiasis that form the nucleus of this comprehensive piece of work, three, which are described at some length, were in man, two were in the camel, and one in a dog.

The human cases were nasal, from which 66 larvae of *Chrysomyia dux* were removed; buccal, 16 larvae of a Chrysomyia closely resembling *dux* removed; and cutaneous, 45 larvae of *Lucilia sericata.* The larvae from the camel were *Wohlfartia* sp. in one case, and *Sarcophaga* sp. in the other; and those from the dog were *Sarcophaga ruficornis* and *Chrysomyia dux.*

Besides the descriptions and figures alluded to above there are some figures of larval parts of *Sarcophaga ruficornis* and *Wohlfartia* sp. and briefer descriptions of the different stages of all the other species concerned.

The subject of the paper is introduced by a synopsis of cases of myiasis previously recorded in India, and concluded with a bibliographical summary. The author is to be congratulated on a very useful piece of work involving much labour.

A. A.

LEON (N.). **A Case of Urethral Myiasis.**—*Jl. Parasit.* 1921. June. Vol. 7. No. 4. pp. 184–185.

The patient in this case produced eleven larvae, stated to have been passed during micturition, having some days before been troubled with voluptuous sensations. The larvae were identified as *Musca domestica.* The author's incredulity was appeased by the patient then and there complaining of a recurrence of the sensations and suddenly in a painful orgasm ejecting eight larvae specifically identical with those at first produced. These larvae were kept, but died two days afterwards.

The author gives reference to two other cases of urethral myiasis, namely R. CHREVREL, *Arch. Parasit.*, 1909, pp. 370–450, and E. HAENENS, *Ann. Bull. Soc. Med. d'Anvers*, 1898, pp. 101–112.

A. A.

WOLLMAN (E.). **Le rôle des mouches dans le transport des germes pathogènes étudié par la méthode des élevages aseptiques.**—*Ann. Inst. Pasteur.* 1921. July. Vol. 35. No. 7. pp. 431–449. With 3 text figs.

The substance of this paper has already been recorded [this *Bulletin*, Vol. 18, p. 200]; in the present paper the subject is presented in full historical detail and perspective.

Experimenting with Calliphora, Lucilia, and Musca, in relation to the several bacilli of anthrax, dysentery, tubercle, and typhoid, if the experiments were rigidly sterilized through all phases, in no case did germs ingested by the larva pass on to the adult.

Sterile conditions were assured by washing the egg-packet alternately in 1 in 2,000 sublimate solution and in distilled water. After a final washing in distilled water the eggs (either singly or several together) are carefully transferred to sterile tubes provisioned with sterilized food; and when the eggs hatch emulsions of the specific bacillus are introduced. Subsequently, in examining the pupae, one end of the pupa is flamed and opened with sterilized scissors and the contents removed by Pasteur pipette; and for examination of the adult flies, selected pupae are sterilized in sublimate solution before the adult emerges.

As regards the carriage of infection by adult flies, the author observed (using the same species of flies and bacilli) that if an infected fly be isolated in one unchanged cell it could remain infective for some time—in one case for 22 days; but that if it be frequently changed into fresh clean cells it became clear of its infection in 8 to 10 days.

A. A.

NEWSTEAD (R.) & EVANS (Alwen M.). **Report on Rat-Flea Investigation.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 287–300. With 4 charts.

Five species of fleas were found on rats from the ships, port, and city of Liverpool, namely *Xenopsylla cheopis*, *Ceratophyllus fasciatus*, *Leptopsylla musculi*, *Ceratophyllus londiniensis*, and *Ctenocephalus canis*. A permanent colony of *X. cheopis* was discovered in warehouses in the docks. *C. fasciatus* was abundant. *L. musculi* was not uncommon on dock rats, but occurred rarely on ship rats. Of *C. canis* only one specimen was observed.

A. A.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part V. Some Miscellaneous Arthropods.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 253–256.

Pulex irritans is extremely common in Arab villages. *Ctenocephalus canis* is common on dog and cat. *Cimex hemiptera* (= *rotundatus*) occurs only in Busra and Baghdad, and has been introduced by Indians. Lice are not absent. The following ticks were collected: *Argas vespertilionis*, found at different times on tents, furniture, and clothes; *Rhipicephalus sanguineus*, common on pariah dogs; *Boöphilus annulatus*, very abundant on cows and buffaloes; *Hyalomma aegyptium*, on almost every dromedary. *Haemaphysalis bispinosa* on calves; and *H. flava*, on dogs.

A. A.

AWATI (P. R.). **Some Notes on** *Conorhinus rubrofasciatus* **(De Geer).** —*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 371–373.

When DONOVAN suggested *Conorhinus rubrofasciatus* as a possible agent in transmitting the kala azar parasite, it was objected [but the objection was not even then in accord with fact] that that insect had never been found in houses. Awati here reports the finding, recently, of adults, nymphs, and larvae of *Conorhinus rubrofasciatus* in Assam, in infected as well as in uninfected houses. The insects were found in the fabric of the houses, in bedstead and bedding, and boxes, and also in pigeons' nests.

A. A.

DEL PONTE (Eduardo). Contribución al estudio del gen. Triatoma Lap.—*Rev. Inst. Bacteriolog.* 1920. May; 1921. Mar. Vol. 2. Nos. 5 & 6. pp. 729-744; 133–196. With 53 figs.

A full account of the anatomy and taxonomy of the bugs of the genus Triatoma, with a tabular synopsis and descriptions of the species.

A. A.

MONTANA. **The Montana State Board of Entomology. Third Biennial Report, 1917-1918, and Fourth Biennial Report, 1919–1920.** [COOLEY (R. A.), Secretary.] 1919. Jan. 60 pp. With 5 folding plans; and 1921. Jan. 44 pp. With 1 text fig. Helena Independent Printing Co.

These reports are occupied entirely with the Rocky Mountain Spotted Fever tick (*Dermacentor venustus*), its bionomy and its eradication.

In the Bitter Root Valley the principal hosts of the larva and nymph are small rodents, the commonest of which is the gopher or ground-squirrel; and in the adult stage the chief hosts are domestic animals (particularly cattle, horses, and sheep), though wild animals, such as the bear, the coyote, the larger rodents, and, above all, the mountain goat, also play a part.

Efforts have been concentrated considerably on destroying the hosts of the larval tick, particularly the ground-squirrel, by means of grain poisoned with strychnine. This has been done systematically by official agency, though owners may distribute the poison on their own land if they wish.

Destroying adult ticks by arsenical dipping of domestic animals has also been provided for, but there are some practical difficulties in carrying it out; animals grazing at large cannot always be collected, and dipping cannot be done at all in the cold and wet spring weather.

Repelling adult ticks from domestic animals seems to be a promising move. It had been noticed that healthy animals with plenty of grease in their skin are seldom infested, and also that applications of kerosene or turpentine and lard for keeping off lice also keep away ticks for a long time; consequently applications of cotton-seed and linseed oil were tried and were found to have a good result.

By prohibiting grazing on grounds known to be infested with ticks or with ground-squirrels it is expected that ticks may suffer fatal deprivation. But mere burning of tick-infested pastures is said to be of not much use—though farmers believe in it—as it does not kill all the ticks present.

In Eastern Montana, where the tick has a wider range, other hosts of the larval and nymphal tick are deer-mice, field-mice, porcupine, and the jack-rabbit, which last also harbours the adult tick.

The original source of the infection has not yet been determined; several rodents are susceptible to infection, the snow-shoe rabbit more than others.

The question whether these measures for eradicating the tick can have a permanent effect is discussed at some length, the conclusion being that they will when the original source of the infection is discovered. For the present, perseverance in the measures outlined above, transferring live stock to tick-free and squirrel-free tracts, converting present pastures into cultivated and fenced fields, and education of the farmer are advocated.

A. A.

PARKER (R. R.). **The Control of Rocky Mountain Spotted Fever in the Bitter Root Valley. A Statement for the Information of Persons residing in the Infected Areas.**—20 pp. The Montana State Board of Entomology. 1921. Mar. Circular 1, Revised.

Contains regulations for the control or eradication of *Dermacentor venustus*, and explanations of the principles upon which they are based.

A. A.

McCORNACK (P. D.). **Paralysis in Children due to the Bite of Wood-Ticks.**—*Jl. Amer. Med. Assoc.* 1921. July 23. Vol. 77. No. 4. pp. 260–263.

After a general review of the subject, with references to original papers, the following cases are recorded:—

1. A robust young woman of 22 years: when examined she had been unable to stand or walk or feed herself for three weeks, and could not hold her head up properly. A large wood-tick was found over the coccyx and removed. Recovery was complete in three days.
2. A girl of two years: when examined the legs were completely paralysed. The mother had removed a large tick from the head just before the examination. Recovery complete next day.
3. A boy not quite two years old: when examined he could not walk or pick up objects. A tick was found on the temple. Recovery followed removal.
4. A girl of four years: the symptoms were restlessness and abdominal pain, followed by severe pains in the knees and inability to stand. A large tick was removed from above the ear, and recovery followed on the sixth day, some enlargement of the cervical glands persisting.
5. A girl of five years: could not stand, or put her foot on the ground for pain; could not hold her head up properly or speak plainly, and had some difficulty in swallowing. A large wood-tick was removed from the occiput, and recovery followed in about a week.
6. A girl of eight years: felt dizzy, staggered, and dressed with difficulty, speech was affected, seemed irrational at times. A tick, identified as *Dermacentor venustus*, was found in the right axilla. Immediate improvement followed its removal, but a large necrosed spot remained.
7. A girl of five years: sickness was followed by difficulty in breathing, total paralysis of arms and legs, inability to speak and swallow,

and semi-stupor. A gorged wood-tick was found on the scalp, but after its removal the child died of bulbar paralysis in fourteen hours.

[In another case reported it is not clear that the symptoms were occasioned by tick-bite, as nothing but a suspicious wound was found.]

8. A boy of seven years: unable to stand, vomited, temperature subnormal and legs cold. After removal of a tick from the scalp, recovery soon followed.

9. A girl of nine years. Symptoms: dizziness, vomiting, inability to stand. A large wood-tick was found in the scalp. Recovery was slow.

10. A girl of four years died before being seen. She had been drowsy and had lost her appetite. A large wood-tick had been found in her head, but had not been removed completely. During the night she had been found in a state of dyspnoea, and died soon afterwards.

11. A girl of six: refused food, was dizzy, and could not walk steadily. Recovered seventy-two hours after removal of a tick from the scalp.

Most of these cases occurred in Idaho and Washington, one in Montana.

A. A.

KHALIL (M.). **On the Occurrence of the Eggs of Mites in the Faeces of Miners in Cornwall and their Subsequent Development on Culture Media.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Diseases and Parasit.). 1921. June. Vol. 14. No. 8. pp. 24–25.

The eggs were found in the faeces of 10 out of 130 men examined at Camborne. They were hatched in the laboratory and ultimately gave issue to adults of *Aleurobius farinae* and *Glycyphagus* sp.

A. A.

GOMES (João Florencio). **Da acção do sôro anti-botropico sobre a intoxicação experimental pelo veneno da** *Lachesis lanceolatus.* [The Action of Anti-bothropic Serum in Experimental Intoxication by the Venom of *Lachesis lanceolatus.*]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* 1920. May. Vol. 3. No. 3. pp. 75–82.

Anti-bothropic serum (anti-venom) is serum immunized to the venom of *Lachesis lanceolatus, atrox, alternatus, neuwiedi,* and *jararacussu.*

The interesting points about the experiments are that dogs which, after they had received a lethal dose (1 mgm. per kilo of body-weight) of the venom of *Lachesis lanceolatus,* received equivalent subcutaneous injections of this anti-bothropic anti-venom one hour subsequently, all recovered, whereas if the treatment were delayed for two or for four hours survivals fell to 50 per cent. and 36 per cent. respectively; and that no better results, to say the least, followed intravenous injection of the anti-venom, while the results of intramuscular injection were very much inferior.

All the experiments are tabulated in detail.

A. A.

TEMBE (R. S.). **Short Notes on Two Cases of Snake-Bite,** *Echis carinata* **(Phoorsa).**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. p. 218.

"In both cases the snake was well grown and was properly identified, in both cases some marks of fangs were visible, in both cases the symptoms recorded were mainly local—acute pain and intense and far-spreading swelling—and in both cases treatment was followed by uneventful recovery. [The season of the year is not recorded.]

A. A.

CATAN DE HOUSSAY (María Angèlica). **Adsorción de los venenos de serpientes por el carbón.**—*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp. 197-231. With 8 figs. [Summary in English.]

The conclusions of this experimental paper are that the haemolytic substance of snake-venom is adsorbed by animal charcoal, but not in accordance with any known law.

The antitoxic serum is not adsorbed. In mixtures of serum and venom in excess the presence of free haemolysin cannot be demonstrated, and in adding varying quantities of haemolysin to the liquid it is only medium doses, not very large doses, that are active; moreover, after adsorption of the venom the liquid still contains a substance which, though not haemolytic, yet neutralizes the anti-haemolysin: it is this substance *plus* that adsorbed by the charcoal that constitutes the haemolysin.

A. A.

KOBAYASHI (Ch.). **On the Application of Calcium Chlorid to Viper-Bites.**—*Japan. Ztschr. f. Dermat. u. Urol.* 1921. Feb. Vol. 21. No. 2. [In Japanese, pp. 144–149. English summary, pp. 7-8.]

Nine patients " bitten by vipers " were treated with calcium chloride, 20 cc. of a 3 per cent. solution being injected intravenously daily for six to ten days, and the pain and local inflammation were greatly relieved. [The summary contains no particulars of the species of vipers, diagnostic features of bites, moment of surgical intervention, etc.]

A. A.

BAYLEY-DECASTRO (A.). **The Poison of the Scolopendridae—being a Special Reference to the Andaman Species.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 207–209. With 2 text figs.

In the author's experience in India and Burma the wound inflicted by a centipede is not very serious, whereas the wound of the large centipedes found in the Andaman Islands is not only extremely painful, but also causes intense local inflammation of the skin and subcutaneous tissues, which may be followed by extensive gangrene; sometimes some amount of lethargy and stupor is also observed.

The author gives photographs of an illustrative case, where, as the result of a wound in the calf inflicted by an Andaman centipede, a process of sloughing was quickly set up which extended over the greater part of the inner surface of the calf and laid the muscles bare, the inflammation ultimately spreading below the ankle.

Some rough but interesting experiments on animals are also recorded, showing the effects of the venom. Guinea-pigs died in 7½ minutes and 2 hours and 35 minutes; a duck died in 10 minutes; the leg of a drake "bitten" in the thigh became paralysed in about 10 minutes; a pup, bitten in the lip, showed a little blood in the urine in the course of its sufferings.

The author states that he failed to get any toxic effects, or indeed to get any venom, from young centipedes.

A. A.

SUZUKI (Tatsuo). **Experimentelle "Habu"—Gift-Nephritis.**—*Mitt. a. d. Pathologischen Inst. der Kaiserlichen Univ. z. Sendai, Japan.* 1921. Vol. 1. No. 2. pp. 225–242.

——. **Experimentelle Studien ueber die chronische Nephritis, welche aus der akuten hervorgeht. (Zweiter Bericht ueber Habugift-Nephritis.)**—*Ibid.* pp. 243–292.

Habu is the vernacular name of the Crotaline snake, *Lachesis flavoviridis*, and these two papers contain an account in very minute detail of the pathological changes experimentally produced in the kidney by the intravenous injection of the venom of this snake. These changes start in the capillaries of the glomeruli and not in the epithelium of the tubules, and the chronic nephritis which follows the experimentally-produced acute nephritis is generally more or less haemorrhagic.

A. A.

EVANS (H. Muir). **The Poison Organs and Venoms of Venomous Fish.**—*Brit. Med. Jl.* 1921. Oct. 29. pp. 690–692. With 2 text figs.

Among the definite statements contained in this rather discursive paper, two may be noted, namely, (1) that the venomous secretion of the spiny dogfish causes oedema locally and paralysis generally, but is not haemolytic; (2) that the venom of the weever, besides causing local extravasation and necrosis and being haemolytic—as is well known—also causes paralysis, and in addition affects the leucocytes, the effect being seen in vacuolation, defective staining, and 25 per cent. impotence against bacteria.

A. A.

SLEEPING SICKNESS.

DUKE (H. Lyndhurst). **On the Zoological Status of the Polymorphic Mammalian Trypanosomes of Africa and their Relation to Man.**—*Parasitology*. 1921. Nov. Vol. 13. No. 4. pp. 352–397. With 1 text fig.

In this long but interesting paper the author endeavours to prove that the polymorphic mammalian trypanosomes of Africa all belong to a single species and not to a multitude of species. The species is characterized by its polymorphism in its vertebrate hosts, and its anterior station in the salivary glands of its Glossina intermediary. Included in this species there are many different varieties or strains, distinguishable from one another by characters of minor systematic importance. These strains are not immutable, but variable, and are determined by the environment in which the species lives; they are not constant, under varying external conditions, but each different strain is dependent upon, and is produced as a response to, a particular environment. If we call this species *Trypanosoma brucei*, then *T. gambiense*, *T. rhodesiense* and *T. nigeriense* are to be regarded as particular strains of *T. brucei*, which have become, after sojourn in other hosts, more or less adapted to life in the blood of man.

This conclusion is based on considerations of the following nature:—

G. palpalis is essentially not a game tsetse in the sense that *G. morsitans* and *G. pallidipes* are. Its main food animals under primitive African conditions are reptiles, possibly birds, man and his stock, the hippopotamus, and such game as may visit its haunts.

The polymorphic trypanosomes so far recovered from game, stock and man in inhabitated *palpalis* areas resemble *T. gambiense* rather than *T. brucei* as regards pathogenicity and the absence of posterior-nuclear forms. With one certain and one doubtful exception, wherever the *brucei* type of trypanosome has been recovered from game or stock in a *palpalis* area, other tsetse species have been present. The only two instances where a trypanosome possessing the characters of the *brucei* group has been recovered from a pure *palpalis* region occur in areas which have for years been uninhabited by man, and where antelope abound, viz., the Sesse Islands and Kiraro Lake near Lake George. In no other region of Africa does antelope play such an important part in the dietary of *G. palpalis* as on the Sesse Islands, where, consequently, the polymorphic trypanosomes have antelope for their almost exclusive host.

In neither the wild fly nor the antelope of these islands have trypanosomes of the *nanum-pecorum* type ever been detected, but *T. vivax* and *T. uniforme* are common in buck and fly. In addition, in both are found the polymorphic organism described from Damba.

Between 1901 and 1909 *T. gambiense* was present in the blood of an enormous number of human beings, and it is certain that a relatively large percentage of the wild fly must have been cyclically infected with this parasite. With the removal of man and stock, the antelope and hippopotamus were increasingly drawn upon by the fly for blood. It is known that *T. gambiense* will survive for many months in the blood of sitatunga, and from 1909 it and the hippopotamus must have constituted the reservoir of the parasite. The numbers of antelope are now enormous, and their relation to fly is very intimate. In 1912 the fly and sitatunga were still carrying a trypanosome resembling *T. gambiense*, and the author believes that " there appears to be no reason to doubt that the polymorphic trypanosomes in the sitatunga and wild *G. palpalis* in the prohibited area of Lake Victoria at the present day are the descendants of the *T. gambiense* which occurred in man at the time of the epidemic."

At the present day certain wild strains differ from those of 1912, notwithstanding that there has been no introduction of fresh strains from outside. Significant variations have been noted in the virulence and morphology of the trypanosomes from Damba, tending towards the characters typical of *T. brucei*. Duke believes that had this parasite existed in 1912, it is incredible that its presence should not have been detected; posterior-nuclear forms certainly did not occur in the 1912 antelope strain. "It appears reasonable, therefore, to regard this newly-recognized *brucei*-like organism as a strain or variety of the older and formerly more common trypanosome, whose general behaviour so strongly resembled the human parasite, *T. gambiense*."

Whether or not, simultaneously with the acquisition of these minor changes, these strains have lost their capacity for survival in man is a question of importance. It is conceivable that those species of trypanosomes which possess the power of utilizing man as a host may lose this power if maintained for sufficiently long periods under natural conditions exclusively in ruminants. The present close relationship between fly, trypanosome and game on Damba are parallel to those existing in *morsitans* country, and "it is possible, therefore, that the prolonged sojourn of a polymorphic trypanosome exclusively in game animals through many generations may result, *per se*, in the assumption by the parasite of the characteristics of the trypanosome known as *T. brucei*, irrespective of the tsetse species concerned with its transmission." These considerations suggest that the differences between *T. gambiense* and *T. brucei* depend upon the predominance in *T. gambiense* areas of hosts other than ruminant game, *i.e.*, man, and possibly hippopotamus and reptiles also.

Besides considering the effects produced upon the trypanosome by sojourn in different vertebrate hosts, we must also take into account the possible effect produced by sojourn in different species of Glossina. We know that *T. gambiense* is transmissible by *G. morsitans*, and *T. brucei* by *G. palpalis*, but we do not know whether after a suitable number of experimental passages through the normally foreign tsetse species *T. gambiense* acquires increased, and *T. brucei* diminished, virulence to laboratory animals; in other words, whether the differences between *T. gambiense* and *T. brucei* are determined by the species of tsetse concerned with transmission. While the matter is obviously susceptible of direct experimental proof, there is at present no certain evidence to prove that the invertebrate host determines—or influences—the characters of the trypanosomes which it is capable of transmitting; and the evidence supplied by the discovery on Damba is against such a supposition.

W. Yorke.

Clapier (P.). **Évolution et état actuel de la trypanosomiase humaine dans le Secteur de prophylaxie no. 11 (Moyen-Congo).**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 405–423.

The object of this work is to show the evolution of sleeping sickness in the region of the middle Congo, known as Sector No. 11, from the first investigations of Martin, Leboeuf and Roubaud (1907), and of Heckenroth (1909), right up to the present time. The author's previous article on the Bangala [this *Bulletin*, Vol. 17, p. 323] constitutes the first portion of this study. The personal figures relate to all infected cases living on the occasion of the last visit to each region of the sector. Except for 170 cases diagnosed clinically, all the diagnoses were parasitological. The population of 220 villages and groups of villages has been wholly examined on several occasions.

In all the regions the disease affects children much more than adults: thus, of a total population of 11,417, comprising 993 patients, we have 7,509 adults, of which 259 are infected (3·4 per cent.), and 3,908 children, of which 734 are infected (18 per cent.). Except in Babolé, where the disease is not very intense, one out of every three children is infected. In each of the hundred odd villages examined, the number of children infected is always greatly above that of the adults, generally five or six times as much. In a previous paper on the Bangala [*loc. cit.*], the author has attempted to show that in countries where trypanosomiasis has become almost completely extinguished in a few years and in those countries where an epidemic is still recent, the disease attacks equally men, women and children. As regards the region under consideration in this paper, the author produces evidence to suggest that the disease is of old standing, and then states that if the chances of infection are equal for adults and children, one can only explain the light infection among the former as a result of immunization. The hypothesis has been advanced that the children are more heavily infected than the adults, because they are more exposed to the bites of the tsetse. The author shows, however, that there is no reason to believe that this is really the case. In his view the problem can be explained if one admits that in this country where trypanosomiasis has long existed in an endemic form, the old people and adults enjoy a degree of immunity due to an increase in the resistance of the body as the result of feeble inoculation.

It is interesting to recall what happens in this country when contingents of troops are introduced into an endemic area. OUZILLEAU gives examples of much more intense infection among a detachment of foreign soldiers than among the autochthonous adults. Clapier records that between November 1919 and August 1920 he visited one or more times the 32 militiamen who had sojourned in Epéna for periods varying from some months to three years. Among them he discovered seven cases (21 per cent.) of sleeping sickness; all these men had been examined before leaving Brazzaville and declared free from infection. In the most heavily infected villages of this district, the indigenous adults were infected only to the extent of 3 to 6·7 per cent. The author points out that these militiamen lived under much better conditions than the indigenous people, their work was light, they were well clothed, slept under a mosquito net and were well fed. These facts indicate a relative immunity on the part of the adult native. The fact that a very great number of children reach between four and ten years of age suggests that this is the period of life when immunity is acquired. Is this not also the case in yellow fever, yaws and malaria? Possibly the relative immunity to trypanosomiasis is really a tolerance in respect of very rare parasites only discoverable with difficulty; the anti-bodies produced in response to this attenuated infection render the organism refractory to new infections. If this is so, it explains the frequent occurrence of autoagglutination in endemic zones.

In the Yessoua and Bocabonga country on the upper and middle Motaba and Ibenga, the disease has retrogressed since 1912 along the upper rivers where the natives are rather isolated and tsetse rare, and it has increased along the middle and lower rivers where the tsetse is very numerous.

The author records some interesting observations on the frequency with which parasites can be found in the peripheral blood among cases of sleeping sickness from various localities. Among 93 cases of the disease (diagnosed by gland puncture) trypanosomes were found in the blood of 19 (20 per cent.); the details are as follows: among 57 cases coming from villages where the percentage of infected was less than 15, trypanosomes were found in the blood of eight (14 per cent.); among 36 cases coming from villages where the percentage of infected was more than 15, trypanosomes were found in the blood of eleven (30 per cent.); and among nine cases from the Bandja villages where the percentage of infected was 19, trypanosomes were found in the blood of five (55 per cent.). The conclusion from this work is that the parasites are found very often by simple direct examination of the blood in places where the disease is in an epidemic form. Reference is made to the fact that HECKENROTH found trypanosomes by direct examination of the blood in 32 per cent. of cases in the Sangha district and LEBOEUF in 37 per cent. of cases in the Oubangui.

W. Y.

BAUVALLET (H.). **Sur un cas de Trypanosomiase humaine à la Basse Côte d'Ivoire.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 326–328.

A brief record of a case of sleeping sickness in a creole, who presumably contracted the disease in the neighbourhood of Bondoukoul whither he had obtained a permit to go in June 1920; until this date he had never been out of the Ivory Coast. The patient was treated with atoxyl and novarsenobenzol and so far as the observation period went had not relapsed.

W. Y.

BASSETT-SMITH (P. W.). **Trypanosomiasis.**—*Jl. Trop. Med. & Hyg.* 1921. Apr. 15. Vol. 24. No. 8. pp. 105–108.

A semi-popular description of the disease containing an account of a case which came under the charge of the author and details of which have appeared elsewhere from time to time.

W. Y.

CLAPIER (P.). **Constatation de *Trypanosoma gambiense* en grande abondance dans le liquide d'hydrocèle.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 378–380.

In August 1920, at Enyèle on the Ibenga, the author came across an old man of about 60 who was suffering from elephantiasis of the scrotum complicated by extremely voluminous bilateral hydroceles. On puncture of the hydroceles a lemon-yellow, almost transparent, fluid escaped; on examining this microscopically several trypanosomes were found in each field, and occasional lymphocytes and small mononuclear cells. A similar state of things was seen in hydrocele fluid of another case, also about 60 years, from the village of Golo.

Commenting on these two cases, details of which are given, Clapier states that it is very rare to find *T. gambiense* in such great abundance by direct examination, even during the febrile periods; he has only seen .. single case when trypanosomes were observable in coverslip preparations of the blood in almost every field, and that was in a man recently infected who exhibited no auto-agglutination of the red cells. It appears that the hydrocele fluid is a very favourable medium for the development of *T. gambiense.* The almost complete disappearance, within a night, of the parasites from the hydrocele fluid in the second case after puncture suggests that the slight traumatic shock of the puncture had resulted in a trypanolytic crisis possibly due to exudation of serum from a small haemorrhage.

W. Y.

REICHENOW (Eduard). **El paralelismo entre la enfermedad del sueño y la sífilis cerebro-espinal y su valor para el pronóstico y la terapéutica.** [Parallelism between Sleeping Sickness and Cerebrospinal Syphilis and its Value in Prognosis and Treatment.]—*Bol. Inst. Nac. Higiene de Alfonso XIII.* 1917. Sept. 30. Vol. 13. No. 51. pp. 199–218.

A translation into Spanish of an article by Reichenow in German. The author points out that though there is a lack of evidence in support of SCHAUDINN'S theory of a close biological relationship between trypanosomes and spirochaetes, there are many close analogies between sleeping sickness and syphilis. Both have a primary and secondary phase, the former, in which the disease is mainly an affection of the blood, responding to treatment, while the latter, in which the parasite has attacked the central nervous system, is recalcitrant, in the case of sleeping sickness completely so. The non-success of atoxyl or salvarsan treatment in the secondary phase is due to the fact that the parasite multiplies in the cerebrospinal fluid and that the drug injected does not penetrate the meninges. Intraspinal injection has been suggested and tried, but without success. In this connexion the observations of TUSZEWSKI (1914) are significant. He found that in animals injected intraspinally with trypanblue the colouring matter spread in the cerebrospinal fluid up to the base of the brain and as far as the frontal lobe, tinging the meninges deeply. It did not, however, spread to the convexity of the brain, nor to the ventricles or their fluid. The author suggests the use of drugs which have the power of penetrating the meninges and so reaching the central nervous system. He has himself experimented with alcohol and with urotropine, and gives a brief résumé of his experiments with the latter drug, promising a more detailed account later. The patients, in all of whom the existence of trypanosomes in the cerebrospinal fluid had been proved, were given 6 gm. of urotropine at fortnightly intervals until 48 gr. had been given. The effect on lymphocytosis in the cerebrospinal fluid was in all the cases—four in number—very marked, the fluid in one case being normal in that respect at the expiration of the treatment. This patient who, in spite of the presence of parasites in the cerebrospinal fluid, was free from nervous symptoms, remained so after treatment. In the other three, in whom the disease was clinically very advanced (ataxia, somnolence, psychic defects), definite improvement was observed in one only. The author considers that his results with urotropine encourage to a further and more extended trial of the drug in cases in which no grave damage has yet been done to the nervous tissue.

F. S. Arnold.

REICHENOW (Eduard). **Ueber *Trypanosoma gambiense* im Liquor cerebrospinalis des Menschen.** [On *T. gambiense* in the Cerebrospinal Fluid of Man.]—*Berlin Klin. Woch.* 1921. Mar. 14. Vol. 58. No. 11. pp. 251–253.

The pathogenic action of *T. gambiense* is quite different in rats and mice and in men. The former succumb sooner or later to the blood infection, which is extraordinarily heavy, whilst in the latter the parasites are much more scanty in the blood ; in old cases of the disease in man very often trypanosomes are no longer to be found there. No human being dies from blood infection of *T. gambiense,* but what makes trypanosomiasis so fateful a disease in man is that sooner or later the parasites penetrate the central nervous system and there exercise their pathogenic action. The parasites do not succeed in entering the cerebrospinal fluid for a long period, as a rule several months after infection.

Examination of the cerebrospinal fluid of numerous cases of sleeping sickness in the Cameroons revealed two points of special interest : the first concerned the parasites and the second the cell increase. As regards the first, it was observed that the trypanosomes in the cerebrospinal fluid were characterized by their especially slender form ; the most striking appearance was, however, the great number of division forms which were encountered in the cerebrospinal fluid. In old-standing cases of sleeping sickness 2 to 6 per cent. of the trypanosomes in the blood were division forms, whilst in the cerebrospinal fluid divisional forms represented an average of 10 per cent. of the total trypanosomes and, rarely, as much as 19 per cent. The number of parasites found in the individual cases varied greatly : in 37 per cent. of cases 1 cc. of cerebrospinal fluid contained 0·1 to 1 trypanosome, in 16 per cent. of cases 1·1 to 2 trypanosomes, in 7 per cent. of cases 2·1 to 3 trypanosomes, and so on, until the highest number of trypanosomes found in 1 cc. was 200. Occasionally, less than 1 trypanosome was found in 10 cc. of fluid, but such cases were rare. Whereas trypanosomes were found in 71 cases, in 9 only a cell increase was discovered. Repeated punctures showed that the number of trypanosomes per 10 cc. of spinal fluid remained for long periods remarkably constant in the individual cases. This absence of periodicity is due to the lack of trypanocidal antibodies in the spinal fluid.

How is it that, notwithstanding the intense reproduction which goes on in the spinal fluid, the number of parasites remains so constant ? It is the cell increase which is responsible for limiting their number. The cell increase is a lymphocytosis ; in addition to typical lymphocytes, there are present in greater or smaller numbers peculiar cells with a large vacuole, designated in the literature " mulberry cells." These cells are really changed lymphocytes. In preparations of spinal fluid containing numerous trypanosomes the parasites can often be seen attached to lymphocytes. According to the author, the trypanosomes, although they are killed by the lymphocytes, are not ingested, but undergo lysis in the spinal fluid, thus giving rise to the toxin which produces the nervous changes.

The degree of lymphocyte increase varies greatly in the individual cases, and corresponds in no way to the number of trypanosomes. It was found, however, that the gravity of the symptoms varies with the number of parasites in the spinal fluid : in cases exhibiting marked lethargy the parasites are always numerous, whereas, when the sleeping sickness symptoms are lacking, the parasites are very scanty.

In a previous communication [this *Bulletin*, Vol. 15, p. 386] the author has shown that the ordinary administration of such drugs as atoxyl, salvarsan, neosalvarsan, trixidin and trypasafrol has no effect on the spinal infection. The parasites in the cerebrospinal fluid can be attacked in two ways, first by intraspinal injection of drugs, and second by the ordinary administration of such drugs as penetrate the central nervous system. By the former method the author succeeded in causing decrease or disappearance of the parasites, but they soon reappeared.

As regards the second method, the author has already recorded his unsuccessful attempt with alcohol. In later experiments he used urotropine, which he combined with atoxyl; the patients were given every two weeks on two consecutive days atoxyl 0·5 gm. and urotropine 3 gm. In this manner a cure was obtained in five cases, in one case atoxyl had no action on the blood infection, and in all other cases and after conclusion of treatment a marked decrease in the number of parasites and lymphocytes in the spinal fluid was observed. The experiments were interrupted by the war.

W. Y.

CONRAN (Philip). **Intermissions in Trypanosomiasis.** [Correspondence.]—*Brit. Med. Jl.* 1921. June 18. p. 916.

When in medical charge of the sleeping sickness area of Nyasaland in 1913 the author came across a child, aged seven, whose blood showed a heavy infection of *T. rhodesiense.* Notwithstanding the fact that no treatment was given, many subsequent examinations of the blood were negative until about a year later, when the parasites reappeared, and death followed shortly afterwards. The author remarks that the occurrence in untreated cases of such long negative periods makes one hesitate before accepting MARSHALL's cases as cured until a long period has passed without relapse.

W. Y.

MURRAY (William A.). **History of the Introduction and Spread of Human Trypanosomiasis (Sleeping Sickness) in British Nyasaland in 1908 and Following Years.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 121–128. With 1 map.

The author, who has been in Nyasaland (Mvera Mission) since 1901, recalls that he dissented strongly from the conclusion reached by the Royal Society Commission, viz., that sleeping sickness has not been introduced into Nyasaland from Tanganyika, but is an endemic disease of the country. In this paper he states his reasons for believing that there was no sleeping sickness in Nyasaland prior to 1907 or 1908, and that the disease was introduced about that time from Lake Tanganyika or Northern Rhodesia or from both.

Nyasaland Government officers had during 1907 and 1908 examined over 60,000 natives for enlargement of glands, and the blood of all sick natives or those with enlarged glands in the tsetse-fly area within the Protectorate, without finding a single case of sleeping sickness until October 1908. For many years previously the Government and Mission doctors scattered throughout Nyasaland (about 30 in all) had examined many thousands of sick natives annually and not a single case of sleeping sickness had been discovered.

Details are given of a few of the earliest cases which were discovered in Nyasaland, and Murray is of opinion that there is reason to believe that these contracted their infection outside Nyasaland.

The first case in Nyasaland was discovered at Nkata Bay in October 1908. The patient gave a history of having travelled the previous year in Tanganyika and the Congo; his type of infection was not determined, but was probably *T. gambiense*, as he lived for at least three years after in excellent health. On the discovery of this case an isolation camp was established at Dowa, and the patient was taken to Domira Bay by steamer, and then conveyed in a hammock (unscreened) through 25 miles of *morsitans*-infested country to Mvera and thence to Dowa. Murray's opinion is that the first infection of fly (with the human trypanosome) along that road occurred on this occasion. The second case of the disease was that of Dr. H., who accidentally infected himself from the first case in November 1908. Shortly afterwards, before recognizing his true condition, Dr. H. journeyed along the Mvera-Maganga road to search for tsetse other than *G. morsitans*, but after about a week was so ill that he had to return to Dowa; he died shortly afterwards. The third case was found at Kota Kota in May 1909, and gave a history of having been on the Luapula; he also was taken to Domira Bay, and thence via Mvera to Dowa without precautions.

The locality of the infection could not be discovered in cases 4 and 5, but cases 6, 7, 8 and 10 had been in or near the Luangwa Valley in 1909. Case 11 was the first case found locally infected, he had never been out of the Mvera-Domira Bay district.

Two medical officers were now detached to examine the district thoroughly, and thirty further cases were found within a 20 miles radius of Domira Bay. The inhabitants of the contiguous fly district north and south were also carefully examined, but no case was found until several months later, and gradually the disease spread until by 1915, practically the whole of the *morsitans* area of Nyasaland was found to contain infected fly, game and natives. Between 1908 and 1919 about 250 cases were discovered. It would now seem that the pathogenicity and spread of the epidemic have diminished and that few cases are to be found.

The author concludes by stating that he thoroughly concurs in the view of Sir David BRUCE's Commission as to the highly important rôle played by the larger varieties of game in the dissemination of the disease in Nyasaland, and in acting as a permanent reservoir of all the trypanosomes pathogenic to man and domestic stock.

[This is rather a curious admission on the part of the author, as, in the reviewer's opinion, it seems to undermine his whole argument. Why labour in an attempt to show that a few infected human beings carried in unscreened hammocks through 25 miles of fly country are responsible for the introduction of the infection when presumably enormous numbers of infected game have been wandering about at large for years ?]

W. Y.

NATTAN-LARRIER (L.). **Maladie du sommeil et hérédité. Maladie du sommeil et gestation.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 65–71.

The only trypanosomes of vertebrates which may be hereditary are those of debab and of Chagas' disease [this *Bulletin*, Vol. 15, p. 46].

Sleeping sickness, without doubt, frequently occurs in young children, but to prove that it is hereditary the blood of the infant must be found to contain trypanosomes a few hours after birth. The author cited in detail an observation of THIROUX [*Sleeping Sickness Bulletin*, Vol. 1, p. 489] which demonstrated that an infected woman can give birth to a healthy child. Experiments are described which show that neither in the rat nor in the guinea-pig is *T. gambiense* transmitted from the mother to the foetus.

Regarding the effect of infection on gestation the author quotes the observations of THIROUX and LEBOEUF (*loc. cit.*), of AUBERT and of GREGGIO [this *Bulletin*, Vol. 7, pp. 103 and 104]. All these observations show, without doubt, the influence of the disease in producing abortions and miscarriages. It is impossible, however, to obtain from them precise information why sometimes gestation proceeds normally, at what period of pregnancy miscarriages occur, or what percentage of the births are premature. Apparently the abortions and premature births do not aggravate the disease in the mother.

Quoting from the same authors, Nattan-Larrier shows that methodical treatment of the mother lessens these accidents very materially, and for this reason, in order to increase the birth-rate in depopulated regions, periodic and adequate treatment is essential.

W. Y.

ROY (J. N.). **Des affections oculaires dans la syphilis et la trypanosomiase humaine chez les indigènes de l'Afrique.**—*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 4. pp. 103–119.

The first part of this paper is a discussion regarding the probable manner of entry of syphilis into Africa.

Among 135 syphilitic natives especially examined from the point of view of ocular disease, lesions of the eye were found on only 16 occasions, and with a single exception the region involved was the anterior segment of the eye.

Eye lesions in natives suffering from trypanosomiasis were extremely rare: of 418 cases examined, only three were found to have deep-seated ocular lesions, and the etiology in these cases was doubtful. Details of these cases are given: in two who exhibited well-marked signs of meningitis there was a papillary oedema, possibly the result of the increase of cerebrospinal fluid; in the third case there was also a papillitis, and the general condition and the visual acuity rapidly improved under atoxyl treatment.

W. Y.

DE OLIVEIRA (Gastão). **Isolamento do "*Trypanosoma Cruzi*" e outras noções concernentes a Molestia de Chagas, no Rio Grande do Sul.** [Isolation of *Trypanosoma cruzi* and other Points concerning Chagas' Disease, in Rio Grandé do Sul.]—*Brazil Medico.* 1920. Feb. 28. Vol. 34. No. 9. pp. 142–143; and *Arch. Rio Grandenses de Med.* Porto Alegre. 1920. Mar. Vol. 1. No. 2. pp. 73–76. With 1 text fig.

In April, 1919, Drs. Aristides DA CINHA, H. ARAUJO, BLESSMANN and ESTEVES, examining a specimen of *Triatoma infestans* (Klug), found large numbers of flagellates with the characters of *Trypanosoma cruzi.* The genus *Triatoma*, profusely distributed throughout the State of Rio Grande do Sul, is represented by three distinct forms—*infestans*

(Klug), *megista* (Burmeister) and *rubrovaria* (Blanchard). The country people call them "chupao" or "fincao"; the name "barbeiro" is unknown. *Triatoma infestans* excels the others greatly, both in numbers and in infectivity. It infests the whole State, and is, by reason of its highly infected and infective condition, the species most dangerous to the inhabitants. *Triatoma megista* is much less numerous. It is found chiefly about mud walls. It appears, in the State of Rio Grande do Sul, to be less adapted to life in human dwellings than is the case in other parts of the country. Of nine specimens received from Canoas, near the capital, six were collected out of doors and only two from beds. All were found, on examination, to be free from flagellates, a result of considerable interest from the point of view of the epidemiology of the disease, especially when taken in connexion with the fact that various specimens of *Triatoma infestans*, from the same locality, were found infected. Two specimens of *T. rubrovaria*—the only ones received—were also found uninfected. To facilitate the study of the geographical distribution of Triatoma species the author divides the State into zones—north, south, littoral and frontier (with Argentina and Uruguay), and gives, district by district, the name of the locally infesting Triatoma and the result of its examination for flagellates.

The district of Egrejinha is, states the author, a vast focus of bronchocele and infected bugs. "All the inhabitants," he says, "suffer from this deformity." The author would appear not to have found the trypanosome in the blood of any of the patients examined, a fact which he attributes to his having paid only a short visit to the infected zones and during the autumn.

F. S. Arnold.

NATTAN-LARRIER (L.). **Hérédité des infections expérimentales à** *Schizotrypanum cruzi.*—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 232–238.

The author points out that although acute Chagas' disease is most frequent in very young children, yet it has never been definitely settled whether the disease can be transmitted from the parent to the offspring. He decided to investigate the point, and carried out experiments on 26 female animals (25 guinea-pigs and one mouse) infected with the strain of *Schizotrypanum cruzi* maintained at the Institut Pasteur in LAVERAN's laboratory.

Abortions were common, and were observed in 19 of the 26 experiments—4 times in animals 30 days pregnant, 8 times between the thirtieth and fortieth days, and 5 times later than the fortieth day. Abortions then appeared to be equally frequent at all periods of gestation. They occurred often during the 20 days following inoculation.

On 11 occasions the author was able to make a satisfactory examination of the young of infected animals—four guinea-pigs were killed, and, to avoid contamination, the young removed from the uterus, with all precautions; three aborted; three gave birth at term, and one mouse also gave birth at term. The blood of the offspring was found infected on two occasions.

The conclusion, then, is that in the guinea-pig the infection can pass from the mother into the amniotic fluid, and even to the foetus. The method by which this takes place the author hopes to discuss in a later communication.

W. Y.

NATTAN-LARRIER (L.). **La schizotrypanosomiase américaine peut-elle être transmise par contagion génitale?**—*C.R. Soc. Biol.* 1921. Apr. 30. Vol. 84. No. 15. pp. 773–775.

The fact is recorded that VIANNA found *Schizotrypanum cruzi* in the semen of two of six infected guinea-pigs, and Nattan-Larrier consequently inquires whether the introduction of the parasites into the vagina can infect the female. He conducted experiments with three mice, introducing into the vagina of each a small quantity of a dilute suspension of *S. cruzi*, all precautions being taken to prevent erosion of the vaginal mucosa. Infection was obtained in each case. In further experiments the permeability of the conjunctiva, of the intestinal mucosa, and of the skin, was examined. Results were negative in each case.

W. Y.

WEICHBRODT (R.). **Bayer 205.**—*Berlin Klin. Woch.* 1921. Jan. 10. Vol. 58. No. 2. pp. 34–35.

In order to determine what amount of this drug could be administered with safety to man, it was necessary to commence with quite small doses and to watch the urine and temperature carefully. As HÄNDEL and JÖTTEN [this *Bulletin*, Vol. 17, p. 333] have shown, the drug is active whether given intravenously, subcutaneously or orally. The drug causes a decrease in the coagulability of the blood, and when given in too large amount produces bleeding from the nose.

After several doses of 1 gm. albumen appears in the urine and persists for several days. Very frequently one observes a reddening of the face and there is a sense of well-being. If there is a rise of temperature, it disappears within 24 hours.

At first the drug was given intravenously in doses of 0·2 gm. five or six times within eight days. In only a single case did albumen appear in the urine, and then after the third injection. Later, 1 gm. doses were given, but a total amount of 3 gm. was not exceeded. Per os 3 gm. was given within 20 hours, and after such doses albumen appeared in the urine on the second day and lasted five days. The drug had no noticeable effect on general paralysis, nor on malaria or recurrent fever.

W. Y.

MAYER (M.) & ZEISS (H.). **Weiteres ueber die Wirkung von "Bayer 205" Serum (Menschenserum).** [A Further Communication on the Action of "Bayer 205" Serum (Human Serum).]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 149–150.

It has already been shown that cured and healthy animals which had been given "Bayer 205" remain protected against infection with trypanosomes up to a period of five months [this *Bulletin*, Vol. 17, pp. 333 and 334]. This is due to the fact that the drug remains for months in an active form inside the body and, indeed, can be demonstrated in the serum. The sooner after treatment the serum is removed, the greater its therapeutic effect, but complete cures have been obtained by the use of serum removed from an animal 51 days after the administration of "Bayer 205." In the work described in this paper the author investigated the question whether the serum of human beings treated with "Bayer 205" possessed a similar therapeutic action.

Serum was obtained from two infants and an adult. As the serum of normal adults exhibits a trypanocidal action against various pathogenic trypanosomes of animals, viz., *T. brucei*, *T. equinum* and *T. equiperdum*, and also against *T. rhodesiense*, it was necessary to inactivate the adult serum by heating to 62°–65° C. for 15 to 60 minutes, in order to destroy this normal trypanocidal power. This procedure was unnecessary in the case of the infants' serum, as such serum does not normally exhibit any trypanocidal action.

The infants had received 1·8 gm. of " Bayer 205 " orally in three days, and 6·95 gm. orally in 17 days, respectively. The serum of the first infant was given in a dose of 1 cc. to a heavily infected nagana mouse ; it became negative for four days, and then trypanosomes reappeared and it died ; similarly, 1 cc. of the serum of the second infant produced a negative period of nine days, but again trypanosomes reappeared and the animal died. In another case 0·6 cc. of the serum cured the animal.

The adult had received 22·4 gm. of " Bayer 205 " in 16 days (8·2 gm. intravenously and 14·2 gm. orally as a powder). The serum was removed on the second and thirteenth days after the last dose of the drug. The second-day serum, in doses of 0·2 to 0·7 cc., cured animals infected with nagana, caderas and dourine ; the thirteenth-day serum likewise effected cures, but only when larger (1 cc.) doses were given.

W. Y.

MÜHLENS (P.) & MENK (W.). **Ueber Behandlung von Menschlicher Trypanosomiasis mit " Bayer 205."** [On the Treatment of Human Trypanosomiasis with " Bayer 205."]—*Muench. Med. Woch* 1921. Nov. 18. Vol. 68. No. 46. pp. 1488–1489.

Details are given of two cases of human trypanosomiasis treated with " Bayer 205 " [this *Bulletin*, Vol. 17, p. 333].

The first case came from Fernando Po, and was infected with *T. gambiense* in October, 1919 ; he exhibited slight attacks of fever, fleeting erythema, enlargement of lymphatic glands, and trypanosomes in the peripheral blood. In March, 1920, he arrived in Hamburg, and was treated with " Bayer 205." The treatment consisted of an intravenous injection of 0·2 gm. of the drug ; the treatment was well borne, and trypanosomes disappeared from the blood for a few days, but soon reappeared. After an interval of seven days a second injection of 0·2 gm. was given. This had but little effect, trypanosomes increased in number, and the patient was consequently put on tartar emetic treatment ; shortly afterwards he returned to Africa and was lost sight of.

The second case was that of a European (G. J.) infected with *T. rhodesiense*, and sent by the reviewer to Hamburg for treatment with " Bayer 205." The patient contracted the disease in the Serinje district of N.E. Rhodesia in September, 1920. He was treated with intravenous injections of tartar emetic, intramuscular injections of antimony oxide, and subcutaneous injections of soamin. As the result was not very satisfactory, 13 injections of stibenyl were given at the beginning of January, 1921, but this was soon abandoned as useless and the previous treatment recommenced. In March the patient returned to England and was treated at the Liverpool School of Tropical Medicine, by the reviewer, with intravenous injections of tartar emetic and subcutaneous injections of atoxyl. As, however, the condition became steadily worse and the infection appeared to be resistant both to antimony and to arsenic, the patient was sent to Hamburg at the beginning of July for treatment with " Bayer 205."

During the eight and a half months he had been ill he had received in all 22·7 gm. of tartar emetic. Shortly after arriving in Hamburg, on July 9, the patient had a rigor and trypanosomes were present in the peripheral blood. Treatment with " Bayer 205 " was commenced immediately; an intravenous injection of 0·5 gm. was given, and the two following days intravenous injections of 1 gm. The injections were well borne, the fever subsided within six hours, and the trypanosomes practically disappeared from the blood; the urine remained normal. After an interval of seven days, during which time the blood examinations were negative, a further injection of 1 gm. was given. As, however, this was followed by the appearance of small quantities of albumen in the urine, no further injections were given. From this date until the patient left Germany, two months later, the blood remained negative. The condition of the patient improved greatly, there were no further febrile disturbances, and the weight increased considerably.

W. Y.

YORKE (Warrington). **The Treatment of a Case of Rhodesian Sleeping Sickness by the Preparation known as " Bayer 205."**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 479–482.

Here we have another record of the case of G.J., containing additional details of the early history of the infection and an account of the treatment at Liverpool and Hamburg. The patient was seen at Liverpool after his return on September 15, when he was remarkably improved and his weight had risen from 132 to 145 pounds; the urine contained a trace of albumen. He returned for examination on November 5. On this, and on the previous occasion, the blood examination and subinoculated rats were negative. There was no autoagglutination nor any sign of the disease. On November 11 he returned to South Africa. Professor Yorke writes :—

> " The above record is of peculiar interest, as it relates to the first case of human trypanosomiasis treated with adequate doses of " Bayer 205." Whilst recognizing that hasty and premature claims of success in the treatment of a disease like sleeping sickness are to be deprecated, and that the further history of the patient alone can decide whether a real *therapia sterilisans magna* has been effected, the facts that the disease was of at least eight and a half months standing at the time of treatment with " Bayer 205 "; that the patient was extremely ill and had been getting steadily worse for months; that the infection was completely resistant to the ordinary preparations of antimony and arsenic; that since the administration of " Bayer 205 " all symptoms of the disease have disappeared, the general condition of the patient has improved enormously, his weight has increased by 18 lbs., his blood has been free from parasites and non-infective to rats for an observation period of four months—these facts, considered in the light of the usual history of cases suffering from *T. rhodesiense*, warrant the hope that in " Bayer 205 " we have a drug of exceptional trypanocidal power."

A. G. B.

VON SCHUCKMANN (W.). **Ueber die Einwirkung von " 205 Bayer " auf Trypanosomen ausserhalb des Tierkörpers.** [On the Action of " Bayer 205 " on Trypanosomes outside the Animal Body.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 485–490. With 4 text figs.

In this paper the author describes the action of " Bayer 205 " on trypanosomes *in vitro*. Inactivated guinea-pig serum (0·5 cc.) was mixed with a trypanosome suspension in sodium citrate solution (0·2 cc.) and placed in a small tube with 0·1 cc. of a 1–10 per cent. solution of " Bayer 205 "; in the control experiments the solution of " Bayer 205 " was replaced by an equal volume of physiological saline. The earlier experiments were conducted at 37° C., but the later ones at room temperature. The parasites used were *T. brucei*, *T. congolense* and *T. equiperdum*. Samples were taken from the tubes at intervals varying from half to two or more hours, and examined in the fresh and stained condition.

No change was noted in the control experiments, the trypanosomes maintaining their normal appearance and activity. The most marked alteration in morphology produced by " Bayer 205 " was an enormous increase in the size of the vacuole situated just anterior to the blepharoplast. (The author produces evidence to show that this vacuole is a constant and normal structure.) Other changes observed were a decrease in the motility of the trypanosomes and marked agglutination of the parasites. The author observes that WENDELSTADT and FELLMER (1906) have recorded somewhat similar changes in the trypanosomes of heavily infected rats after the administration of brilliant green.

W. Y.

WENYON (C. M.). **The Action of " Bayer 205 " on** *Trypanosoma equiperdum* **in Experimentally Infected Mice.**—*Brit. Med. Jl.* 1921. Nov. 5. p. 746.

The author obtained a sample of the drug from Dr. C. R. HENNINGS, through the intermediary of Sir David BRUCE, and tested its therapeutic action on a very virulent strain of *T. equiperdum*, which killed mice in three or four days. In all cases, the drug was given 48 hours after inoculation, when trypanosomes were swarming in the blood. It was found that a dose of 2·5 mgm. per kilo of body weight caused the trypanosomes to disappear, but that relapse occurred in about a week. A dose of 5 mgm. per kilo was not followed by any relapse during ten weeks' observation. It was possible to give a mouse with a heavy infection as much as 500 mgm. per kilo, but sometimes the animals succumbed to its toxic effects within 24 hours; with half this dose the toxic reaction is slight.

Wenyon writes that " Bayer 205 " has a remarkable action on the trypanosomes, in that in every instance (over 50 mice) a single injection of a suitable dose has apparently brought about a *therapia sterilisans magna*, and this in a dose which is considerably lower than that which can be given without killing the animals.

W. Y.

PEARCE (Louise). **Studies on the Treatment of Human Trypanosomiasis with Tryparsamide (the Sodium Salt of N-Phenylglycineamide-*p*-Arsonic Acid).**—*Jl. Experim. Med.* Supplement No. 1. 1921. Dec. 1. Vol. 34. No. 6. 104 pp. With 7 charts in text.

This paper is the report of a mission sent by the Rockefeller Institute to the Belgian Congo in May, 1920, to study the effect of tryparsamide (the sodium salt of n-phenylglycineamide-*p*-arsonic acid) [this *Bulletin*, Vol. 15, p. 390, and Vol. 17, p. 333] on patients suffering from sleeping sickness. All the work was done at the Government laboratory and Hôpital de la Reine in Léopoldville. The 77 cases treated represented all grades of the infection, and included previously untreated cases as well as several who had been treated with one or more drugs for varying lengths of time. Trypanosomes were found in 67 cases by gland puncture, in one case in the centrifuged blood, and in one case in the spinal fluid; in eight cases under treatment at the time of transfer trypanosomes were not found. A lumbar puncture was made before treatment in 72 cases—it was omitted in the case of an infant and in four ambulatory patients.

Tryparsamide is a white crystalline substance of stable character and is extremely soluble in water in concentrations as high as 50 per cent. [For further chemical details *vide* papers cited above.] In most cases a 20 per cent. solution was used, being injected intravenously, but varying strengths from 10 to 40 per cent. were also employed. When injected into the tissues it is quickly absorbed and produces but slight irritation; in a few patients the injections were made deeply in the muscles of the buttocks.

The paper is divided into three sections, dealing respectively with (1) the administration of single doses in early cases; (2) the administration of repeated doses in early cases, and (3) the administration of repeated doses in advanced cases.

The author gives the following discussion of her results:—

"The purpose of the work reported in this paper was the obtaining of certain fundamental facts in regard to the action of tryparsamide in human trypanosomiasis, since experimental toxicologic and therapeutic investigations with the drug had indicated its possible use in the treatment of patients suffering from this disease. The observations of 77 patients in early and advanced stages of trypanosomiasis caused by *Tr. gambiense* and treated with tryparsamide formed the basis for this study. The patients came from various parts of the Belgian Congo, and most of them had not received previous treatment.

"It was realized that objective information on the action of single doses must precede the use of several doses and, further, that the effect of a few doses be studied before one could devise a logical system of repeated dose therapy. Consequently, the work was conducted along the general lines suggested by these principles. The first observations were concerned with determining the trypanocidal action of various sized doses of tryparsamide by microscopic examinations of centrifuged blood and lymph gland juice, and included both the time of occurrence of this action and its duration in relation to the time of treatment. From a series of some 90 examinations after the treatment of patients in all stages of the disease with doses ranging from 0·3 to 7·0 gm., or 4·7 to 112 mg. per kilo of body weight, administered intravenously in most instances, it was found that tryparsamide was an active trypanocidal agent, since its administration was consistently followed by negative examinations for trypanosomes in the superficial lymph glands and blood within 24 hours. The smaller doses up to 50 mg. per kilo of body weight produced negative lymph gland and blood examinations within 15 hours in the majority of cases, and this number was increased after larger doses of 54 to 112 mg. per kilo. In certain patients, no trypanosomes were found in the blood as early as 3½ hours after treatment but, in general, doses of 2·0, 3·0 and 4·0 gm. produced a peripheral sterilization in from 6 to 12 hours.

"The duration of peripheral sterilization induced by single doses of tryparsamide was next studied in patients in the first period of the disease, or as indicated by a slight increase in the number of cells of the cerebrospinal fluid, in the beginning of the advanced period. Without taking into account differences in the severity or type of the infections in individual patients, it was found that the duration of peripheral sterilization varied from 17 to 58 days in the 12 patients who had been given single doses of 0·5 to 5·0 gm., or from 17 to 83 mg. per kilo of body weight.

On the other hand, no peripheral relapse was detected during observation periods of from 40 to 111 days in the 9 patients who had been treated with single doses of 0·5 to 3·0 gm., or from 9 to 68 mg. per kilo. It appears, therefore, that within the limits of dosage of from 0·5 to 5·0 gm., peripheral sterilization in relapsed patients endures on an average of from 3 to 6 weeks; but since there was one relapse 17 days after treatment, it seemed advisable in planning a system of repeated doses to begin with intervals of 1 and 2 weeks until the results of larger series of single dose administrations should be available for consideration.

"The effects of intramuscular administration upon the duration of peripheral sterilization are significant. Four patients were treated by this route with single doses of from 37 to 57 mg. per kilo; the immediate effect upon the trypanosomes in lymph glands and blood was similar to that observed after the intravenous route, but on the whole the duration of this action was definitely more prolonged, as seen by the average time of relapse, 7 weeks after treatment. In 3 patients there was practically no local reaction, while the tenderness and induration which occurred in one instance was probably due to a passing mild infection. While no subcutaneous injections were given, a slight amount of drug solution escaped into the tissues surrounding the vein in a few instances, but no irritation or discomfort of any sort arose, and in a few hours complete absorption had taken place.

"The spinal fluid of early cases treated with single doses of tryparsamide was examined, because of the possibility that the disease might progress and involve the central nervous system during the period of blood and lymph gland sterilization. A lumbar puncture was made on an average of 5 weeks after treatment in 14 patients with initial normal or slightly abnormal spinal fluids who had been given single doses ranging from 0·5 to 3·0 gm. or 9·0 to 68·0 mg. per kilo. In every instance except one the second cell count continued to be normal, or was decreased to within or toward normal limits; in one patient the result was uncertain because of blood contamination of the first specimen of spinal fluid. No trypanosomes, however, could be found in the lymph gland juice, centrifuged blood, or centrifuged spinal fluid of this patient.

"The general physical reaction of patients in the first period of the disease treated with single doses was prompt and satisfactory. In two or three days after treatment the subjective symptoms disappeared and the pulse rate and temperature became normal; within a month the blood count was materially improved, the patient had gained weight, and the cervical lymph glands were small and indurated. Interruptions of this favourable course of events occurred in those patients who harboured other infections, or who ultimately had a trypanosomal relapse, but in general a definite and usually a marked beneficial effect was observed. In addition, no untoward reactions of any kind were observed in these patients, either of an immediate occurrence or of a more delayed appearance.

"The use of repeated doses of tryparsamide was based upon the action of single doses, and a number of previously untreated patients, as well as those who had suffered a relapse after single doses, were given from 4 to 7 doses of 2·0 to 5·0 gm. at weekly or fortnightly intervals. Only the initial observations are at present available. The preliminary effect as regards negative trypanosome examinations of lymph glands and blood and general clinical improvement indicated by the disappearance of subjective symptoms, pulse and temperature curves, blood counts, gain in strength, and increase in weight occurred in both groups of patients. Microscopic examinations of lymph gland juice and centrifuged blood made from time to time during the course of treatment were uniformly negative.

"Obviously no predictions of the ultimate therapeutic results in these patients can be made, and while it is not unlikely that future experience may show that a more prolonged system of therapy is necessary, it seemed advisable in the beginning to determine the effect of a relatively small number of doses.

"The treatment of advanced cases of trypanosomiasis must take into account not only the invasion of the cerebrospinal axis by the infecting organism and the resultant injuries, but also the chronicity of the disease, its tendency toward exacerbation and the debilitated physical state of many patients. With these facts in view, some system of repeated dose therapy appears obligatory, and the treatment with tryparsamide, therefore, based upon the action of single doses, consisted in the administration of several doses ranging from 1·0 to 7·0 gm. at intervals of from 3 to 14 days. Twenty-eight patients, who presented a wide variety of nervous and mental symptoms, and whose spinal fluid showed an increased cell content of from 15 to 572 lymphocytes per cmm., together with large mononuclears and mulberry cells in most instances, were under observation for a sufficient length of time after treatment to permit of subsequent lumbar punctures as well as other clinical examination. The cell content of the spinal fluid was used as a criterion of the degree of cerebrospinal involvement, as well as a therapeutic guide, and also as an index of the effect of treatment.'

"The immediate sterilizing action of tryparsamide was noted in those patients whose lymph gland examination was positive on admittance; trypanosomes were not found in seven patients who were being treated with atoxyl and tartar emetic at the time of transfer to tryparsamide therapy. Repeated microscopic examinations of lymph gland juice and centrifuged blood made during the period of observation were negative in all patients. In general, the physical status of the patients was materially benefited, as was shown by the return of the pulse and temperature to normal limits, the prompt disappearance of the subjective symptoms, and by improved blood counts and gains in weight. The improvement in habits and personal appearance of several patients was also noticeable. The early termination of treatment in three patients was followed by a clinical exacerbation of the disease and ensuing death; in one of the three there was a complicating acute amoebic dysentery. The nervous and mental symptoms which were present in many instances were greatly improved or completely eliminated, except in two very advanced patients with marked mental deterioration, who had been treated with other drugs for long periods of time, and in whom the change was slight.

"The effect of tryparsamide upon advanced trypanosomiasis, as illustrated by this group of patients, is further evidenced by the marked and rapid diminution of the cells of the spinal fluid. In general, three or four weekly doses of 3·0, 4·0, or 5·0 gm. produced decreases of from 57 to 98 per cent. in an average of five weeks. In five patients, whose treatment was limited to one such course, the cell content continued to decrease in four instances, as shown by a practically normal third examination made 9 to 12 weeks after admittance, while in one patient there was no further decrease. Sixteen patients who were given second courses of treatment showed a continued decrease of cells; three showed practically no change from the count made after the first course of treatment; in one there was a slight increase in cells, and in another, after three irregularly spaced doses, the cells had returned to practically the original count. In this limited number of cases it was apparently more difficult to accomplish a further decrease of the spinal fluid cell content by a second course of treatment than it was to produce the initial and marked diminution by the first course, but at any rate, in these five instances, the active progression of the disease was apparently arrested. Considering the pathological conditions of cerebrospinal trypanosomiasis, it seems not unlikely that a longer first course of treatment than that employed in most of these patients would give more satisfactory results. Regarding the effect produced by more frequent smaller doses, as contrasted with larger doses separated by longer intervals of time, it appears that the use of semiweekly doses of 2·0 gm., for instance, had apparently no advantage over a weekly dose of 3·0 or 4·0 gm.

"Finally, we wish to consider the only untoward effect encountered during the course of this work. Dimness of vision of various degrees occurred in nine advanced cases, five of whom had received previous arsenical treatment. It should be pointed out that there was no instance of visual disturbance of any kind in the early cases or in the first stages of the cerebrospinal period of the disease, or after any single dose of tryparsamide. The largest dose given in our cases was 7·0 gm. In the majority of instances this effect was entirely transitory and in the others various degrees of improvement took place. Three patients, who were given too frequent an administration of medium sized doses, showed considerable degrees of impairment, and of these two recovered completely; of three other patients with about the same degree of impairment one showed slight improvement, another moderate improvement, and the third complete recovery, while in the remaining three a less marked visual disability was transitory. It would seem from a study of these cases that too frequent administration of medium and large doses to patients suffering from very advanced trypanosomiasis is one factor that contributed to this condition. It is significant to note in this connection that resumption of treatment with smaller or more widely spaced doses was not followed by a return of the condition or by an intensification of residual symptoms. In addition, the time of occurrence of this untoward effect, two to seven days after treatment, together with the nature of the pathological injury to the optic structures in cerebrospinal trypanosomiasis, and the fact that improvement of some degree always occurred, suggests that the cause of the visual impairment is related to the processes of resolution and healing of the lesion already present rather than to a direct toxic action upon the nerve itself. The ophthalmoscopic examination of several patients who had partially or completely recovered from this condition also lends support to this view. The experimental work with tryparsamide showed that apparently the drug possesses the power of tissue-penetrability to a marked degree, since a characteristic feature of the treatment of rabbit trypanosomiasis was the rapidity and completeness with which extensive cutaneous and subcutaneous lesions regressed and healed. Individual variations in the extent or degree of lesions is the probable explanation of the fact that several patients with as markedly altered spinal fluids, and as pronounced nervous and mental symptoms developed no visual disturbances whatever after similar treatment.

"From the facts at our disposal, it would appear that the occasional occurrence of visual disturbances, which may perhaps be avoided by a slightly different system of dose repetition, does not at present constitute an objection to the use of the drug. The impression which one has after treating advanced cases with tryparsamide is that a suitable interval between doses of a certain size is probably the most important factor in preventing the occurrence of untoward visual effects. Doses of 3·0 gm. or over should preferably not be given oftener than once a week, and since longer intervals between doses have been followed by clinical improvement and marked decreases in the cells of the spinal fluid, further use of a system of wider spaced repeated doses may show similar beneficial therapeutic effects without concomitant visual disturbances."

[This lengthy paper, to which it is difficult to do justice in a short summary, is well worth careful study by those interested in the subject. It contains a mass of carefully collected observations admirably set forth and is, in the reviewer's opinion, a solid contribution.]

W. Y.

MARSHALL (Claude H.) & VASSALLO (S. M.). **Further Report on the Treatment of Sleeping Sickness.**—*Brit. Med. Jl.* 1921. May 28. pp. 773–775.

MARSHALL (Claude H.). **A New Method of Treatment of Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 and May 20. Vol. 15. Nos. 1 and 2. pp. 10–20. (Discussion pp. 20–34. With 1 fig.)

——. **A Paper on a New Method of Treatment of Human Trypanosomiasis.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 15. Vol. 24. No. 20. pp. 265–267. With 1 text-fig.

EYRE (J. W. H.) & MARSHALL (C. H.). **A Case of Trypanosomiasis treated by Intrathecal Serum.**—*Brit. Med. Jl.* 1921. Aug. 20. pp. 284–286.

These papers deal with the same matter, and give later information concerning experiments on the treatment of sleeping sickness described a year ago [this *Bulletin*, Vol. 16, p. 368]. The authors state that attempts to cure patients infected with trypanosomes have, in the vast majority of cases, proved unsuccessful, although individuals—certainly European and Asiatic, possibly also African—have recovered. Most authorities are agreed that a single dose of salvarsan, neosalvarsan or atoxyl is sufficient to sterilize the blood-stream, but within a variable period the symptoms reappear. Two theories have been offered to account for this—(1) that the trypanosome assumes a resistant form and becomes " fast " to the particular drug used ; (2) that some of the parasites are protected from the action of the drug owing to their secluded position in the central nervous system. The authors consider the latter is the correct explanation, and cite a number of cases which they believe support this view. In these cases the blood and gland juice were rendered free from parasites by an injection of neo-kharsivan, but punctures made three days to three and a half months afterwards showed trypanosomes in the cerebrospinal fluid.

Post-mortem examination of one or two fatal cases of sleeping sickness showed the meninges of the brain to be greatly thickened, and the authors believe that these changes prevent drugs circulating in the blood-stream reaching the spinal fluid, so that, although the parasites in the blood are killed off by the drug, the infection persists in the central nervous system and reinfects the blood-stream again. They quote Professor KEITH as stating that " There is no doubt that infections in the basal cisterns do reach the cervical glands, and that very probably this occurs through the nerve-sheaths." In the treatment of sleeping sickness two separate foci of infection must be considered. Firstly, that of the blood-stream and, secondly, that of the cerebrospinal fluid.

Acting on the above assumption, the authors at first attempted intrathecal, in addition to intravenous, medication ; the result was fatal, and the experiment was not repeated. The following procedure was then adopted :—

An intravenous injection of neokharsivan was given, and three hours later blood was withdrawn from the patient into a sterile covered vessel, which was left standing in a bowl of cold water for 20 hours. The serum was then removed from the clot and 20 minims injected into the spinal canal after a corresponding amount of spinal fluid had been withdrawn.

Of 56 cases treated up to the present 21 were treated during the last six months and have not been re-examined. Of the remainder, eight are dead, or presumed to be dead; three died of sleeping sickness, three died of intercurrent disease, and two disappeared, presumably owing to death. The other cases have been re-examined at periods varying from six months to 27 months after treatment. The blood, glands and cerebrospinal fluid were in each case negative, and all were doing well. The number of re-examinations was, however, very few. Two cases were re-examined five times, one case four times, six cases three times, and the rest only twice or once.

The authors suggest that the beneficial action of intrathecal injection of serum is due to trypanolytic antibodies present in the serum, but absent from the cerebrospinal fluid, and with a view to testing this theory they propose to repeat their experiments on other cases, omitting, however, intravenous injections of neokharsivan. One case so treated has gone on well for six months; no trypanosomes could be found in the blood or spinal fluid, and the cervical glands have disappeared.

Details are given concerning the treatment by this method of a European patient who contracted sleeping sickness in July, 1920. In September he was given an intravenous injection of 0·9 gm. of neokharsivan; blood was withdrawn half an hour later, and 12 cc. of the serum injected into the spinal canal. There was a severe reaction, lasting several days, and then uninterrupted recovery. On November 2, 1920, however, although direct blood examination was negative, one or two sub-inoculated rats became infected. On December 21, 1920, a single degenerated trypanosome was found in a blood film, but inoculation of the blood into two guinea-pigs was negative. On January 20, 1921, lumbar puncture was performed and the cerebrospinal fluid found to be negative; it was inoculated into two rats, with a negative result. Further examinations on April 7 and May 2, 1921, were likewise negative.

The authors believe that the presumed cure in this case is due to the intrathecal injection, which dealt with that focus of infection, while the continued formation of trypanolysins in the blood destroys the parasites in the blood-stream.

[It must be noted in this connexion that there is no record that the cerebrospinal fluid of this patient was infected before treatment commenced, and, consequently, we have no reason to believe that there was any focus of infection in the spinal canal.]

The authors summarize their work as follows:—

> "To sum up, as far as our experiments have gone, they show (1) that there are two distinct foci of infection in an established case of sleeping sickness, and that of these the focus in the central nervous system is the important one, but that this can be dealt with effectively by a single dose of some sort of serum; (2) that the results of such serum treatment in over fifty cases appear to be better than any of the results hitherto obtained by repeated intravenous or subcutaneous injection of salvarsan, atoxyl, antimony, or other preparations; and we suggest that the curative effect results from the formation and action of some form of trypanolysin."

[Reference has already been made to these papers; see this *Bulletin*, Vol. 18, pp. 155–174.]

W. Y.

SHIRCORE (J. O.). **Trypanosomiasis: a New Method of Treatment.** [Correspondence.]—*Lancet*. 1921. Sept. 24. pp. 680–681.

In this letter the author refers to the papers of MARSHALL and VASSALLO, and points out that the method of treatment of trypanosomiasis by intrathecal injection of serum was suggested many years ago by THIROUX and D'ANFREVILLE, and by BALFOUR (*Sleeping Sickness Bulletin*, 1909, p. 223 and p. 163).

W. Y.

SCHAMBERG (Jay Frank), KOLMER (John A.) & RAIZISS (George W.). **The Toxicity and Trypanocidal Activity of Sodium Arsphenamin.**—*Jl. Amer. Med. Assoc.* 1921. June 25. Vol. 76. No. 26. pp. 1823–1824.

The authors investigated the toxicity and trypanocidal activity of sodium arsphenamin and compared them with those of arsphenamin and neoarsphenamin [this *Bulletin*, Vol. 17, p. 332]. The experiments were carried out in rats infected with *T. equiperdum*.

The conclusions are as follows :—

" 1. The highest tolerated dose of sodium arsphenamin for white rats by intravenous injection was found to be from 212 to 215 mg. per kilogram of weight. The average tolerated dose of arsphenamin was 105 mg., and of neo-arsphenamin 200 mg., per kilogram.

" 2. The smallest trypanocidal doses of sodium arsphenamin varied from 16 to 24 mg., per kilogram of weight; the smallest trypanocidal dose of arsphenamin was 5 mg., and of neo-arsphenamin 9 mg. per kilogram.

" 3. The therapeutic dose (dosis curativa) of sodium arsphenamin was from eight to thirteen times less than the highest tolerated dose (dosis tolerata), which expresses the therapeutic index of this compound. The therapeutic dose of arsphenamin was twenty-one times less than the tolerated dose, and the therapeutic dose of neo-arsphenamin was twenty-two times less.

" 4. Therefore, while sodium arsphenamin possesses the low toxicity of neo-arsphenamin, it is much inferior to both arsphenamin and neo-arsphenamin in trypanocidal or curative activity.

" 5. The true gage of a remedy is expressed by its chemotherapeutic index, *i.e.*, the relation of the curative to the toxic doses."

W. Y.

i. SAZERAC (R.) & LEVADITI (C.). **Action du bismuth sur la syphilis et sur la trypanosomiase du nagana.**—*C.R. Acad. Sci.* 1921. May 30. Vol. 172. No. 22. pp. 1391–1392.

ii. —— & ——. **Action du bismuth sur le trypanosome du nagana.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 430–431.

i. Reference is made to the fact that SOUTAN and ROBERT have shown that bismuth exerts a prophylactic and, to a certain extent, curative action in spirochaetosis of fowls, and that they stated that they had obtained positive results in the treatment of trypanosomiasis with the same preparation.

Sazerac and Levaditi have tested the action of tartro-bismuthate of potassium and sodium on rabbits experimentally infected with spirochaetes from cases of human syphilis, and also on rabbits experimentally infected with *Sp. cuniculi*. In later experiments they employed the drug in the treatment of a guinea-pig infected with nagana.

The conclusions are that the tartro-bismuthate of potassium and sodium has a definite curative effect on experimental syphilis of the rabbit, and also that it has some therapeutic value in the treatment of nagana. They propose to ascertain the effect of other derivatives of bismuth.

ii. It was found that guinea-pigs could tolerate a dose of potassium, or sodium, bismuth tartrate of 200 mgm. per kilo of body weight. A dose of 100 mgm. per kilo, caused trypanosomes to disappear from the blood within one to two days, but a relapse occurred in 12 to 15 days. When the dose was increased to 200 mgm. per kilo the relapse was delayed for a month.

W. Y.

JAMOT. **De l'utilisation des naturels de l'Afrique équatoriale pour la lutte contre la maladie du sommeil.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.-Feb.-Mar. Vol. 19. No. 1. pp. 85-92.

During the war it was necessary to employ native assistants in the combat against sleeping sickness, in French Equatorial Africa, to make good the deficiency of medical personnel. The natives, although illiterate, proved capable of acquiring rapidly the necessary manipulative skill for the microscopic diagnosis and treatment.

The author had charge in the Oubangui-Chari district at the beginning of 1917 of a dozen native and two European hospital assistants. All had received the same instruction and were interchangeable, but in order to obtain the maximum of efficiency they were each given a definite piece of work. They were grouped into three mobile groups—one for diagnosis, the other two for treatment. The diagnosis group consisted of five natives, of whom three were occupied exclusively with microscopic examination and the other two with gland puncture. Each treatment gang consisted of two men: one gang followed the diagnosis gang and worked under the direction of a doctor or European assistant; the other worked under the direction of a European assistant and was charged with administering to each patient the treatment ordered by the doctor.

Further details are given illustrating the manner in which the service functioned.

The patients received a preliminary treatment of atoxyl (1 gm. per adult, or about 1·5 cgm. per kilo of body weight); the patient was then provided with a tally, on which was inscribed the treatment given and that which should be given subsequently.

Operating in this manner, the service has been able to visit, in less than two years, all the villages in the area of 100,000 square kilometres. Of 89,743 persons examined, 5,247 were found to be infected. It was found that the patients who were not treated died in the proportion of 40 per cent. annually; in the whole section, which possessed a population of about 100,000 persons, 2,071 died from trypanosomiasis during the year which preceded the operation of the service.

As a result of treatment by atoxyl in the above-mentioned doses every month or every two or three months in an irregular manner, or by atoxyl associated with neosalvarsan, it was estimated that in the year which followed the commencement of the service 714 died, *i.e.*, a decrease in mortality of 65 per cent. Moreover, examination of blood, by the centrifugation method, of 753 patients treated as above, two to 23 months after the last treatment, showed 598 to be negative, *i.e.*, a reduction in the mass of infective cases of about 80 per cent.

The author states that these results show that it is possible to rely very considerably on native co-operation in the campaign against trypanosomiasis.

At the end of Jamot's paper Inspector-General GOUZIEN gave a résumé of the present position of the campaign against sleeping sickness in French Equatorial Africa. On the invitation of the Governor-General of French Equatorial Africa, a commission was established in December, 1917, under the presidency of GOUZIEN, and comprising among its members WURTZ, MESNIL and ROUBAUD. The recommendations of this commission were transmitted to the various colonies in the form of instructions. They concern themselves with measures devised with the object of diminishing the trypanosome reservoir by periodic atoxylization of infective natives, measures directed towards the definite cures of the infected, the establishment of sanitary barriers to prevent the passage of infected from one zone to another, the clearing of the bush and undergrowth, and the displacement of certain villages [see this *Bulletin*, Vol. 16, pp. 362–3].

W. Y.

LEPINE. **La prophylaxie de la maladie du sommeil au Cameroün.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 172-178.

Investigations during the years 1916 to 1919 have shown that there exists only a single important focus of sleeping sickness, in the Haut-Nyong region. From January to March, 1920, a mission was sent to examine all the country between Akonolinga and Doumé. Of the 3,042 persons examined, 123 were found to be infected with trypanosomes, 11 others exhibited well-marked clinical signs of the disease, and 48 were regarded as suspects.

Machinery was then devised to combat the infection, and the organization consisted of three parts, the first dealing with prophylaxis, the second with instruction, and the third with the isolation of the infected in a camp.

The prophylaxis section consists of three subdivisions, viz., that of Akonolinga, that of Doumé, and that of Abong-Bang. The operations of the section are described ; each recognized case receives immediately an injection of atoxyl, which is renewed as frequently as possible, in order to obtain not only sterilization of the blood, but eventually cure.

Up to December 31, 1920, 11,419 natives had been examined, and 2,503 were found to be infected.

The centre of instruction, which was established provisionally at Akonolinga, was subsequently removed to Ajos, where the sleeping sickness camp also was established, and here the doctors and hospital attendants were able to familiarize themselves with the different clinical types of the disease and to learn to search for trypanosomes.

The isolation hospital was established at Ajos on October 1, 1920, and up to December 31, 1920, 96 cases had been admitted ; of these 8 have died, 2 have run away, and 10 have been discharged greatly improved, if not cured.

W. Y.

CLAPIER (P.). **Contribution à l'étude des résultats thérapeutiques fournis par l'atoxylisation prophylactique dans la trypanosomiase humaine.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 238–247.

From December, 1913, to July, 1914, OUZILLEAU discovered and treated a great number of cases of sleeping sickness in the districts Ibenga-Motaba (Middle Oubangui) which comprise Sector II. in the French Congo. Acting under the instructions of OUZILLEAU, the author conducted an inquiry, during the period July, 1920, to January, 1921, into the fate of these natives.

In the records the patients were divided into "suspects," "clinically infected," and "certainly infected." Of 1,078 natives recognized in 1914 as "certainly infected" by discovery of the trypanosome, 538 (49·9 per cent.) had died during the six and a half years, 167 (15·5 per cent.) had disappeared, and 373 (34·6 per cent.) were living and were re-examined. From December, 1913, to the end of July, 1914, these patients had received one, two, or three injections of atoxyl in doses of 1 gm. for an adult and 1·5 to 2 cgm. per kilo for a child. During the re-examination of the region 52 of the old infected cases were found to harbour trypanosomes, but whether this was due to relapse or reinfection it is impossible to say; the author inclines to the view that they were reinfected. In 44 of the cases trypanosomes were found by direct examination of gland juice, and in eight other cases by the blood centrifugation method. The latter method was undertaken whenever time permitted, and in all 115 cases were so examined, with 6·9 per cent. of positive results. The author points out that if this method had been adopted in all cases showing no glandular signs, one might have expected to find altogether 70 cases infected,—that is, 18·7 per cent. of the old cases which were found again and re-examined. Thus six years after atoxylization a third of the cases treated were re-examined, and of these about 80 per cent. were free from infection; almost all of them were leading a normal life in their ordinary conditions.

In the second part of his paper the author gives the results of periodic atoxylization of patients from the same sector, commencing in February, 1919. A total of 3,147 infected persons was treated and received in all 10,133 injections. During a mean observation period of 17 to 18 months, 509 (16 per cent.) died. They received one to nine injections each. Details are given in a table, where it is shown that 81 per cent. of those who died did so after the first or second injection, during the six or eight months which followed diagnosis. After this period the mortality became very slight. The heavy mortality in the early months was due to the fact that on the occasion of the first visit to a district a number of very advanced cases were seen.

Those cases which have survived have received injections pretty regularly, at least one every six months, but this has usually been largely exceeded, the average number of injections received by each patient per half-year varying from 1·9 to 6·1 according to the district in which he lived. The dose was 1 gm. for an adult and 1·5 to 2 cgm. per kilo for a child. An attempt has been made during the visits to the various districts to double the injections, *i.e.*, to give injections to each patient at intervals varying from one to three weeks.

W. Y.

BATTAGLIA (Mario). **Histologische Veränderungen in den Organen an experimenteller Trypanosomiasis verendeter Tiere.** [Histological Changes in the Organs of Animals which have succumbed to Experimental Trypanosomiasis.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Vol. 86. No. 5. pp. 393–395.

The author gives the following brief summary of results previously obtained by him on this subject:—

T. vespertilionis is always pathogenic in rabbits, but does not produce keratitis.

T. lewisi is not always pathogenic, but it produces keratitis or ulcerating granuloma of the sexual organs.

T. brucei is always pathogenic in rabbits, and frequently produces a progressive keratitis which involves the whole of the ocular integuments and gives rise to an ulcerating hard cartilaginous granuloma of the sexual organs.

T. dromedarii is always pathogenic in rabbits, and frequently produces keratitis which tends to resorption and is not progressive, and causes an ulcerating granuloma of the sexual organs, which, however, is not so hard or so cartilaginous as that due to *T. brucei.*

T. gambiense is always pathogenic to rabbits, but seldom produces keratitis; when inoculated into the genital organs, it gives rise to oedema, but no granuloma.

The macroscopic and microscopic histological changes found in the various organs of animals which have died from the different infections are almost the same. The chief of these are: hepatitis, which has been described in an earlier paper*; splenitis, changes in the subendocardial and subepicardial tissue, kidneys, salivary glands, pancreas and testes; and hyperaemia of the entire alimentary canal and of the interlobular and subpleural connective tissue.

The dura and pia of the brain and spinal cord are very hyperaemic and infiltrated with lymphoid cells. All the vessels, especially the arterioles, showed a thickened intima. The nucleus of the nerve cells shows chromatolysis and the Nissl's granules stain feebly. No change is to be seen in the myelin threads nor in the axis cylinders; the perineurium and endoneurium of the peripheral nerves are thickened and infiltrated with lymphoid elements.

W. Y.

DI DONIZIO (Giovanni). **Su due Tripanosomi del Bestiame nella Somalia Italiana.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 423–432. With 2 text figs. [French Summary p. 433.]

The author states that in Italian Somaliland he found two trypanosomes in domestic stock: the first was of the type *dimorphon-congolense* and was very pathogenic to cattle, the second was of the type *brucei-pecaudi* and infected Equidae. [The paper is illustrated by microphotographs of the two parasites which confirm the author's diagnosis, the first parasite being apparently *T. congolense* and the second *T. brucei.*] The author remarks that the parasites described by MARTOGLIO under the names *T. somalilense* and *T. cellii* are really mixed infections of the first-named trypanosomes, possibly with the addition of *T. cazalboui.*

W. Y.

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* *Cent. f. Bakt.* 1 Abt. Orig. 1908. Vol. 46. No. 4.

SERGENT (Edm.) & DONATIEN (A.). **De l'infection latente dans la trypanosomiase des dromadaires (le debab). (XXIIe note.)**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. July. Vol. 1. No. 2. pp. 179–184.

Debab in the dromedary is characterized by a slowly progressive cachexia often fatal, and in females by the constant symptom of abortion. During the course of the infection febrile disturbances occur, and these are always accompanied by the appearance of trypanosomes in the blood ; conversely, if trypanosomes are seen in the blood one can be certain that the temperature is raised. The normal temperature of adult dromedaries is 37° C. ; during the febrile paroxysms it is raised two or three degrees. The number of trypanosomes in the blood varies from one to a preparation up to a number so great that it exceeds that of the red cells. Careful study of the disease reveals two phases—the one acute, sometimes terminating in death, and the other chronic, with occasional exacerbations ending in death from cachexia or recovery.

The latent periods between the febrile attacks may be very long ; in one instance it was about three and a half months. The best means of making a diagnosis during a latent period is the subinoculation of a large quantity of blood into a susceptible animal, *e.g.*, dogs. Details of the course of the disease in five naturally infected and in four experimentally infected animals are given in tabular form.

W. Y.

i. SERGENT (Edm. & Et.) & FOLEY (H.). **Essais de traitement du debab, trypanosomiase des dromadaires. I. Afridol. II. Trypanobleu. III. Émétique et Atoxyl.**—*Ann. Inst. Pasteur.* 1921. Mar. Vol. 35. No. 3. pp. 204–206.

ii. SERGENT (Edm. & Et.), DONATIEN (A.) & LHÉRITIER (A.). **Essais de traitement du debab, trypanosomiase des dromadaires. IV. Étude de l'action de l'émétique.**— *Ibid.* pp. 207–211.

i. Two camels experimentally infected with debab were treated with afridol ; the drug was given subcutaneously. The first animal had 15 gm. during four months, five injections of 2 to 4 gm. each being given. The trypanosomes did not disappear for a long time after injection, but the condition of the animal rapidly improved, and ultimately the blood became negative. The second animal received approximately the same dosage, but without any effect, death finally occurring, and at the time parasites were present in the blood.

Two dromedaries naturally infected, and one experimentally infected, were treated with trypanblue, but without success.

Two experimentally infected dromedaries were treated with tartar emetic and atoxyl. An intravenous injection of 2 gm. of the former and a subcutaneous injection of 3 gm. of the latter were given each week for a period of three weeks ; both animals were cured.

ii. In further experiments with tartar emetic on dromedaries infected with debab the authors examined first the action of a single intravenous injection, and found that the dose which should be given is 1 gm., which causes trypanosomes to disappear from the blood and the temperature to fall for eight days. As usually parasites reappeared after eight days, it was found necessary to give a series of injections, and finally a series of four injections was given at intervals of a week.

Each time trypanosomes reappeared a further series of four injections was given.

Of six dromedaries treated in this manner, four were cured; two were poisoned by the drug (one dying and the other still showing trypanosomes). It was found that those dromedaries did best which had received the smallest amount of the drug, as when the organism is poisoned the parasiticidal action of the drug was lost. The four animals which were cured received between 17 and 28 gm. of tartar emetic in nine to ten months; the two in which treatment was unsuccessful were given 38–39 gm. in twelve months.

The general conclusion is that tartar emetic is of great value in the treatment of debab.

W. Y.

BRODEN (A.) & VAN GOIDSENHOVEN (Ch.). **Le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. May 7. Vol. 84. No. 16. pp. 839–840.

The blood centrifugation method is recommended as a means of finding *T. equiperdum* in the blood of dourine horses. The technique adopted by the authors is as follows:—

> A volume of blood equal to about 50 cc. or so, depending on the size of the centrifuge, is divided into two portions and centrifuged at about 1,000 to 1,400 per minute, until the red cells are fairly well separated from the plasma; the latter, which contains a few red cells, is then removed and centrifuged again at 1,400 to 1,500 per minute for eight to ten minutes, by which means the remaining red cells are completely deposited; the plasma is again removed and centrifuged a third time at 3,000 to 3,500 per minute for eight to ten minutes. The deposit from this final centrifugation consists of platelets, a few leucocytes and trypanosomes, if these are present.

This procedure, which was adopted by Broden in the diagnosis of human trypanosomiasis [this *Bulletin*, Vol. 17, p. 326], gave a positive result in the horse examined.

W. Y.

BESSEMANS (A.). **La réaction de Bordet-Gengou dans le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 256–258.

The author refers in some detail to previous papers dealing with this subject. In his experiments he has examined 81 sera from normal horses, and horses suspected to have, or definitely affected with, dourine. As antigen he used a glycerine extract of trypanosomes obtained by centrifugation of the blood of heavily infected rats and guinea-pigs. Details of the technique are given. It was found that the serum of untreated horses showing clinical symptoms of the disease gave a positive result in all of seven cases, and the serum of horses which showed no clinical signs of the disease gave a negative reaction in all of 20 cases. Of 17 animals showing clinical signs and treated by atoxyl only three, which had been subjected to a prolonged and intense treatment, gave negative results. With regard to animals suspected (either from their lesions or from their history) to have the disease, of 37 cases 19 gave a negative reaction, 11 a feebly positive reaction, and 7 a definitely positive reaction.

The author remarks that the three antigens (surra, nagana and dourine) used by him gave the same results. On the other hand, antigens prepared from spirochaetes and from organ extracts gave entirely negative results.

The conclusion is that the reaction is specific for the genus *Trypanosoma* and is of value in the diagnosis of dourine in horses.

W. Y.

BESSEMANS (A.). **Effet du chauffage sur les sérums de cheval dans la réaction de Bordet-Gengou pour de diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. Nov. 12. Vol. 85. No. 32. pp. 889–892. With 2 text figs.

There is a difference of opinion on the value of the complement deviation test for dourine. Bessemans, however, points out that the different investigators have not all inactivated their sera in the same manner, the temperature used varying from 50° to 60° C., and the duration from 15 to 30 minutes.

As a result of his work, the author concludes :—

1. The serum of a normal horse contains, in variable quantity, substances capable of producing with dourine antigen a non-specific deviation of complement. After heating at 56° to 58° C. for 30 minutes, the quantity of this substance is considerably reduced ; heating to 60° C. for 20 minutes causes it practically to disappear.

2. In applying the complement deviation test, it is then essential to inactivate the serum by heating at 60° C. for at least 30 minutes.

3. Theoretically, it may be expected that certain sera of slightly affected animals may not give the test ; in practice it is found that this is the case only with sera from animals recently infected or intensely treated.

W. Y.

LANFRANCHI (Alessandro) & SANI (Luigi). **L'intrapalpebro-reazione nella diagnosi del Morbo Coitale Maligno.** [The Intrapalpebral Reaction in the Diagnosis of Dourine.]—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 374–377. With 1 plate. [French Summary p. 378.]

The authors used as antigen *T. brucei*, and the virus of Lanfranchi obtained free from the elements of the blood by means of a haemolytic serum, emulsified in glycerine (1 to 3), or in glycerine diluted with normal saline or distilled water. In infected animals the reactions were almost like those obtained in positive mallein reactions. The palpebral oedema appears in three to four hours and reaches its maximum in 12 to 18 hours, and then disappears slowly, being visible up to the thirty-sixth hour. The reaction is accompanied by slight fever and photophobia and lachrymation. In treated animals the oedema is more rapid, attains its maximum in 10 or 11 hours, and disappears in 20 to 24 hours ; the febrile disturbance is also less marked. In healthy animals the local reaction is almost comparable with that seen in treated animals, but the fever is generally absent. It will, without doubt, be possible, by utilizing *T. equiperdum* itself as antigen, to obtain results of practical importance.

W. Y.

NATTAN-LARRIER (L.). **Pénétration du trypanosome de la dourine à travers les muqueuses et les téguments.**—*C.R. Soc. Biol.* 1921. May 7. Vol. 84. No. 16. pp. 824–826.

The author inquires whether *T. equiperdum*, which can traverse the vaginal mucosa even more easily than *Schizotrypanum cruzi*, is able to penetrate the skin, the conjunctival mucosa, or the rectal mucosa ? As a result of experiments on mice he found that *T. equiperdum* penetrated the conjunctiva in one of five cases, the rectal mucosa in one of three cases, and the depilated skin in both of two cases.

W. Y.

NATTAN-LARRIER (L.). **Essais de transmission héréditaire de la dourine.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 273–277.

The experiments described in this paper were conducted with MESNIL'S strain of *T. equiperdum*, which kills mice in four to five days and rats in five to eight days.

Pregnant rats and mice were inoculated with trypanosomes, and their young, which were generally born dead, examined for trypanosomes, both directly and by inoculation of their blood and organ pulp into healthy animals. In four cases the young lived for sufficient time for the infection to have developed. The result was that no evidence was obtained that *T. equiperdum* passed from the mother to the foetus.

Further experiments showed that the young born of infected females possessed no immunity to the infection.

W. Y.

NATTAN-LARRIER (L.). **Infections par** *Trypanosoma equiperdum* **chez la souris et chez le rat.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 433–442.

In order to study the pathogenicity of *T. equiperdum*, the author used a strain obtained from MESNIL in 1912. As a result of his experiments he found that the pathogenicity of the parasite, at first slight, was rapidly and regularly exalted by passage through mice, until the infection became very virulent. As the virulence increased in mice, so it also increased in rats and even in guinea-pigs. The infection produced in mice oedema of the cephalic region and in the rat plaques were seen analogous to those described by ROUGET in dourine-infected dogs.

W. Y.

CHATTON (Edouard) & COURRIER (Robert). **Sur un trypanosome de la chauve-souris,** *Vesperugo pipistrellus,* **à formes crithidiennes intratissulaires et cystigènes. Hypothèse relative à l'étiologie du goître endémique.**—*C.R. Acad. Sci.* 1921. May 17. Vol. 172. No. 20. pp. 1254–1257.

—— & ——. **Un** *Schizotrypanum* **chez les chauves-souris** (*Vesperugo pipistrellus*) **en Basse-Alsace. Schizotrypanose et goître endémique.** —*C.R. Soc. Biol.* 1921. May 21. Vol. 84. No. 18. pp. 943–946. With 3 text figs.

In Lower-Alsace a parasite belonging to the genus *Schizotrypanum* was found in 10 per cent. of bats, *Vesperugo pipistrellus.* In the circulating blood, the parasite resembles *T. lewisi*, but is smaller, being 15–20μ long and 10–20μ broad [*sic*]. The blepharoplast is spherical or ellipsoidal, and situated close to the posterior extremity, which is pointed; the nucleus is at the junction of the anterior and middle thirds of the body. The body is rather rigid, the undulating membrane being only slightly folded, and the free portion of the flagellum is equal to about half the length of the body. Division in the peripheral blood was never seen. Multiplication takes place in the organs, *e.g.*, in the mucosa and sub-mucosa of the stomach and intestine, the gall bladder, kidney, urinary bladder, spleen, ovary, uterus, epididymis and peritoneum. Liver, lungs, muscles, nervous system and skin are apparently free. The parasite is not found to assume a leishmania form as in *Schizotrypanum cruzi*, but assumes a crithidial form, the undulating membrane and flagellum being reduced, but functioning. The blepharoplast is situated in front of the nucleus and is elongate. The parasites are massed together in cysts with a thin fibrous capsule. In the larger cysts the crithidias become transformed into trypanosomes and the walls of the cysts containing trypanosomes are thinner than those of cysts containing crithidia, so that the trypanosomes can escape into the circulation. Cultures were made on Novy-Neal-Nicolle medium and are remarkable for the predominance of the parasites of the trypanosome form, differing little from that found in the blood. Of the 35 bats examined, only three showed trypanosomes on direct examination of the blood, and these also gave positive cultures. All the bats were bled and their organs examined, and only the three in which trypanosomes were found in the blood presented the visceral cysts containing crithidia and trypanosomes.

The authors propose to give this parasite the name *Schizotrypanum pipistrelli*.

W. Y.

SERGENT (Étienne). **Trypanosome isolé du sang d'un** *Macacus sinicus*. —*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 57. With 1 text fig.

Cultures on NNN of the blood of a *Macacus sinicus* revealed the presence of a trypanosome which direct examination of the blood failed to show. The body is long and narrow and only slightly undulating; the cytoplasm is granular both anterior and posterior to the nucleus, which lies at the centre of the body; the blepharoplast is small and relatively far from the posterior extremity; the undulating membrane is narrow and the free flagellum is short. The total length of the parasite varies from 18 to 32·5μ; other measurements are given.

W. Y.

STEFFAN (Paul). **Beobachtungen ueber den Verlauf der künstlichen Infektion der Ratte mit** *Trypanosoma lewisi*. [The Course of the Artificial Infection of Rats with *T. lewisi*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 241–247. With 1 chart in text.

The conclusions are as follows :—

1. Artificial infection of rats with *T. lewisi* exhibits an acute and a chronic form. The acute form ends either in the death of the host or in the disappearance of the parasites from the peripheral blood, or changes into the chronic form.

2. On the occurrence of this change the intensity of infection of the peripheral blood falls steeply, whilst during the chronic stage it falls in a gentle curve, so that gradually the parasites disappear completely from the blood; relapses do not occur.

3. In the acute stages multiple division is the normal occurrence; instances of unequal longitudinal division are seen at the same time, whilst equal longitudinal division occurs quite rarely.

4. In the chronic stages multiplication does not take place, and divisional forms are not seen.

W. Y.

WARREN (Shields). *Trypanosoma lewisi* **in Boston Rats.**—*Jl. Med. Res.* 1921. June–Sept. Vol. 42. No. 4. (Whole No. 184). pp. 419–437. With 2 text figs.

The following summary is given:—

" 1. Of 2,009 rats from the city of Boston examined in the first four months of 1921, 341, or 17 per cent., were infected with *Trypanosoma lewisi*.

" 2. Examination was made by means of stained smears.

" 3. No other blood parasites than *T. lewisi* were found.

" 4. The infection is probably least at the season of the year during which the work was done.

" 5. The infection in Boston is apparently localized in the market district, with outlying foci along the water-front; but this is probably due merely to the migration of infected rats in toward the market.

" 6. Only a very small percentage of infected rats showed division forms in their blood, due probably to unfavourable climatic conditions for transmission.

" 7. No infected rats showed definite lesions, but nearly all showed blood changes.

" 8. A map, showing the geographic distribution of *T. lewisi*, is given, and a summary of the data on which it is based."

W. Y.

DELANOË (P.). **Au sujet de** *Trypanosoma talpae*, **Nabarro.**—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 453–455. With 1 text fig.

A description is given of *T. talpae*, which the author found in the blood of a mole at Chalons-sur-Marne. The parasite is actively motile, its length is about 35μ, it has a free flagellum, the free portion of which measures 4 to 6μ, and its breadth is about 6μ.

W. Y.

HEGNER (R. W.). **Measurements of** *Trypanosoma diemyctyli* **from Different Hosts and their Relation to Specific Identification, Heredity and Environment.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 105–113. With 2 text figs.

The following summary is given:—

" 1. Every one of 78 aquatic specimens and two of seven land specimens of the newt, *Diemyctylus viridescens*, collected in Pennsylvania were found to be infected with *Trypanosoma diemyctyli*, Tobey. No trypanosomes were found in 72 specimens of five other species of salamanders. Inoculation experiments with *T. diemyctyli* on six species of salamanders and two species of frogs were unsuccessful.

" 2. Measurements were made of trypanosomes from 10 newts. These groups of trypanosomes differed from one another in their range of variation in total length exclusive of the flagellum, in the length of portions, and in the width of the body, in the average length of the entire body exclusive of the flagellum, in the average length of portions, and in the average width.

"3. Length and width show a positive correlation, and on an average the longer the specimen the wider it is.

"4. Of 106 trypanosomes from one newt, 100 were uniformly small, and the remaining six were much larger, indicating two different types in a single host.

"5. The different types of trypanosomes obtained from the different newts are probably races of one species that are heritably diverse in size. They may, however, belong to different species, or may be sexual phases of a single species, or may differ because of changes due to the environment."

W. Y.

Zeiss (Heinz). **Die Einwirkung menschlichen Serum von Hodgkinscher Krankheit auf** *Trypanosoma brucei* **und** *rhodesiense.* [The Action of Human Serum in Hodgkin's Disease on *T. brucei* and *T. rhodesiense.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 7. pp. 211–215.

The conclusions are :—

Human serum from two cases of true Hodgkin's disease acted on *T. brucei* exactly as normal human serum ; that is, when given in doses of 0·3, 0·5 and 1 cc. at the same time as the virus, it prevents infection. *T. rhodesiense* was not influenced in the same unequivocal manner, since the infection was not always prevented, even by a dose of 1 cc. of the serum. When the serum was administered at the height of the infection, the parasites were caused to disappear only in the case of *T. equinum.*

W. Y.

Zeiss (Heinz). **Die Einwirkung ikterischen Menschenserums auf tier- und menschenpathogene Trypanosomen.** [The Action of Icteric Human Serum on Trypanosomes of Man and Animals.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 10. pp. 302–309.

The conclusions are :—

1. Icteric human serum has no trypanocidal action on *T. brucei, T. equinum, T. equiperdum, T. rhodesiense, T. gambiense* and *Schiz. cruzi.*

2. Contact with icteric serum *in vitro* for one to three hours at 37° C. had no detrimental effect on the infectivity of the parasites.

3. Icteric serum can be activated by normal serum, that is, the trypanocidal bodies can either be stirred up or added to it. This fact suggests that in severe icteric conditions normal serum might be employed therapeutically in order to invigorate the deranged liver function which manifests itself in absence of trypanocidal power.

4. A photodynamic action of icteric serum has not yet been established.

W. Y.

Rosenthal (F.) & Krueger (M.). **Die Klinische Bedeutung der trypanoziden Serumsubstanz für die Serodiagnose der Leberinsuffizienz. I. Mitteilung.** [The Clinical Significance of the Trypanocidal Serum Substance for the Serum Diagnosis of Liver Insufficiency.]—*Berlin. Klin. Woch.* 1921. Apr. 18. Vol. 58. No. 16. pp. 382–386.

There exists in the serum of man and the anthropoid apes a specific antitrypanocidal substance. This body is much decreased in amount, not only in cases exhibiting marked lesions of the liver without icterus, but also in cases of mechanical jaundice. In the work recorded in this paper the authors have endeavoured first to determine the constancy of this phenomenon, and second, to investigate its cause. They asked themselves whether the disappearance of the trypanocidal substance in icteric conditions was the result of a destructive process owing to the entry of bile into the blood, or whether it was bound up with specific disturbance of the liver function.

In their experiments, the authors used a strain of nagana which killed mice regularly in three to four days ; the animals were inoculated intraperitoneally with a dilute suspension of trypanosomes and subcutaneously with the serum to be examined. As the result of preliminary observations, it was found that a prophylactic dose of 0·1 cc. of serum per 20 gm. mouse never failed to exert a definite trypanocidal effect. Whilst, even in grave diseases, no definite lessening of this effect was observed, it was greatly diminished in patients suffering from mechanical jaundice or severe diffuse liver diseases. As the result of a considerable number of experiments, details of some of which are given, the authors conclude that the disappearance of the trypanocidal substance from the serum is, in the absence of icterus, not a sensitive criterion of fine changes in the liver substance, but only a serological symptom of severe functional disturbances of the completely diseased organ.

Experiments were then undertaken to ascertain whether the addition of human bile to the serum inhibited its prophylactic action ; this was found to be the case where the serum was mixed with bile in the proportion of 3–1. Later experiments showed, however, that when bile was added to the serum in the proportion of the bilirubin concentration of icteric serum, the trypanocidal action was in general not destroyed. The general conclusion from experiments of this kind is that the individual bile constituents, *e.g.*, bilirubin, cholesterin, and the bile salts, even in concentration equal to the maximum found in icteric blood, do not destroy the trypanocidal effect of the serum. Only sodium glycocholate in a concentration of 0·2 per cent. exerted an inconstant effect, and such a concentration is scarcely ever reached, even in the most severe jaundice. The disappearance of the trypanocidal power of the serum in mechanical jaundice is, therefore, not due to primary toxicity of the bile constituents. The fact that of all the diseases of man only icterus accompanying disease of the liver, and severe liver disease without icterus produce this effect, suggests the conclusion that the trypanocidal power of human serum stands in the closest relationship with the functional activity of the liver, and that in all probability the liver is the place of formation of the trypanocidal serum bodies.

The authors are consequently of opinion that they have succeeded in demonstrating a new physiological function of the liver, and, at the same time, a sero-diagnostic method of examining the liver function.

W. Y.

PINTO (Cesar). **Contribuição ao estudo da transmissão dos trypanosomas pelos hirudineos. (Nota prévia.)** [Study of Transmission of Trypanosomes by Leeches. (Preliminary Note.)]—*Brazil Medico.* 1921. Apr. 23. Year 35. Vol. 1. No. 17. pp. 205–206. With 1 text fig.

The author refers to work of E. von BASSEWITZ on the transmission of *Trypanosoma equinum* by the bite of *Haementeria officinalis* Filippi.

In 1911, Astrogildo MACHADO found *T. rotatorium* parasitic in the frog, *Leptodactylus ocellatus.* After examination of the blood of frogs from the neighbourhood of Manguinhos, the author confirms his findings. He has attempted further experiments with the object of discovering whether *Haementeria lutzi* can transmit the trypanosome. Leeches sucking infected frogs were examined daily. The forms of Crithidia found in their digestive organs were identical with those observed by DOFLEIN in cultures of *T. rotatorium in vitro,* showing, in the author's opinion, that this trypanosome can develop in *H. lutzi.* To withdraw blood from the digestive organs of the leech, he washes the ventral surface with physiological solution and inserts a fine needle into the caecum, gently compressing the body of the animal.

Leeches of the genus *Haementeria* are parasitic on the higher animals in Mexico, Paraguay and Brazil (*Haementeria officinalis* Filippi); *H. ghilianii* Filippi, in Para, Amazonas, Colombia, Chile, the Argentine and Paraguay; *H. lutzi* Pinto, in the States of Minas Geraes, Rio de Janeiro, Sao Paulo and Parana.

A. G. B.

SANI (Luigi). **Sull'isolamento dei tripanosomi del sangue.** [On the Isolation of Trypanosomes from the Blood.]—*Ann. d'Igiene.* 1921. Sept. Vol. 31. No. 9. pp. 536–544.

Reference is made to the difficulty which is experienced in obtaining trypanosomes free from other bodies. The author discusses in detail the various methods which have been devised by different investigators, and points out objections to each of them; he eventually decided to employ a haemolytic and leucolytic serum specific for the blood of the animal from which he proposed to obtain the trypanosomes, *i.e.*, the dog. A haemolytic serum was prepared by injecting well-washed dog's erythrocytes and leucocytes into rabbits. It was found that the serum thus obtained did not possess a very marked haemolytic action on dogs' blood, and the reason for this was probably the extraordinarily high degree of agglutinating power which it possessed and which interfered with the lytic action.

The technique finally adopted was briefly as follows:—Blood was withdrawn from a dog at the height of the infection, added to an equal volume of 1·5 per cent. sodium citrate solution, and centrifuged at low speed (700 revolutions per minute) for 5 to 10 minutes. In this way the majority of the erythrocytes were sedimented, while the trypanosomes and leucocytes remained in suspension. The supernatant fluid was then decanted and centrifuged at as high a speed as possible, until the trypanosomes, leucocytes and remaining red cells were sedimented. The deposit was removed, diluted with 20 times its volume of normal saline, and then the specific haemolytic serum and complement added in proper proportions and the mixture incubated at 37° C. for 20 minutes; on centrifuging the deposit is found to consist of trypanosomes. The parasites, which are morphologically intact and actively motile, are washed with physiological saline solution.

W. Y.

BECKWITH (T. D.) & REICH (W. W.). **The Variation in the Size of *Trypanosoma brucei* according to the Host.**—*Proc. Soc. Experim. Biol. & Med.* 1921. May. Vol. 18. No. 8. pp. 316–317.

The authors quote from the literature certain records which indicate that a certain species of trypanosome may show differences in size according to the host infected; they point out, however, that there is much divergence of opinion on this matter.

A culture of *T. brucei* was obtained from NOVY and immediately upon receipt inoculated into a rat. On the death of the rat, a guinea-pig was inoculated with the heart blood, and on the death of the guinea-pig another guinea-pig and a white rat were inoculated. In this manner the host altered from time to time. The series of animals used included four rats and four guinea-pigs. Numerous films were made from heart blood as soon after death as possible, within an hour at most, and stained with Wright's stain. Measurements were then made by means of a properly calibrated series of lenses and with a filar micrometer. By this means 100 individuals were examined from the guinea-pigs and 90 from the rats; all the parasites were in the fully developed stage with typical morphology. The average size of *T. brucei* was found to be $18 \cdot 46\mu \times 3 \cdot 16\mu$ in guinea-pigs, and $13 \cdot 25\mu \times 2 \cdot 23\mu$ in rats.

The conclusion is, that *T. brucei* does vary in size according to the host infected, and that it is markedly larger in the guinea-pig than in the white rat.

[This conclusion can hardly be accepted on the evidence furnished, for a number of reasons. The films were made after death, and it is well known that trypanosomes begin to disintegrate and change in shape shortly after the death of the host. We are not informed what the author means by *T. brucei*. Is NOVY's strain the old strain sent back by BRUCE from Zululand and described by PLIMMER and BRADFORD in 1899, or is it the polymorphic parasite now commonly known as *T. brucei*? If the latter, then the observation recorded above can be of little value, as attention has been frequently drawn to the fact that the long forms predominate on certain days of the infection and the short forms on others. Consequently, the results obtained by measurements of such comparatively small numbers as 100 and 90 individuals, chosen at random from four guinea-pigs and four rats, do not warrant the conclusion drawn by the authors.]

W. Y.

DIOS (R.) & OYARZÁBAL (J.). **Sobre estados endoglobulares en Tripanosoma del Surra** (*evansi*) **y en Tripanosoma del Mal de Caderas** (*equinum*). [Endoglobular Forms in *T. evansi* and *T. equinum*.]—*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp. 113–120. With 3 plates and 5 charts. [Summary in English.]

The conclusions are:—

"With horses infected by way of experiment with Trypanosoma Surra and Mal de Caderas, besides Trypanosomes, interglobular forms were found [in] the organs of fallen animals and [exhibiting] some resemblance to Malaria-Plasmodies, and in the living blood as well. These forms, which had some resemblance to Malaria-Plasmodies and also to Piroplasma, are coloured with Giemsa in a typical manner. Control investigations in other horses yielded always negative results.

"As Piroplasmosis of horses is not known in the Argentine, and as these interglobular parasites were exhibited following experimental infection with Trypanosomes, it appears that we have to deal with a phase of interglobular evolution of the Trypanosomes."

[This paper is illustrated by four excellent plates. In the reviewer's opinion, the intracorpuscular bodies have nothing to do with the trypanosomes, but appear clearly to belong to the Piroplasma group.]

W. Y.

i. Unna (P. G.) & Wissig (E. Th.). **Das Histon des Trypanosomenkerns.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 141–144.
ii. Mayer (Martin). **Bemerkungen zu obiger Erwiderung.** [Unna & Wissig.]—*Ibid.* pp. 144–145.
iii. Oesterlin (Ernst). **Bemerkungen zu P. G. Unnas und E. Th. Wissigs Erwiderung auf meine Arbeit zur Chemie des Trypanosomenkerns.**—*Ibid.* No. 6. pp. 183–185.

i. This paper is a reply to Oesterlin, who has criticized previous work of Unna and Teilemann on the chemical nature of the trypanosome nucleus [this *Bulletin*, Vol. 15, p. 48, and Vol. 16, p. 376]. The authors have repeated the observations of Unna and Teilemann on the effect of 12 hours exposure of freshly made trypanosome films to a saturated solution of silver sulphate, and find that the nucleus was dissolved; furthermore, they found even 0·5 per cent. solution of silver sulphate was sufficient to cause disappearance of the nucleus. For these and other reasons they hold, notwithstanding the work of Oesterlin, that the nucleus of *T. gambiense* gives the reactions of histon.

ii. Mayer writes that he has controlled all Oesterlin's findings and has examined some of his preparations. On account of Unna and Wissig's rejoinder, he has tested the effect of accurately prepared saturated silver sulphate solution on many trypanosome films, and in contradistinction to Unna and Wissig has, like Oesterlin, always obtained good nuclear staining with Giemsa's stain. For this and other reasons, Mayer agrees with Oesterlin that the histon nature of the trypanosome nucleus has not been proved.

W. Y.

Jensen (E. T.). The Cure of Sleeping Sickness. [Correspondence.] —*Brit. Med. Jl.* 1921. Nov. 12. p. 814.

——. Trypanocide [Correspondence.]—*Lancet.* 1921. Nov. 12. pp. 1025–1026.

Yorke (Warrington). The Cure of Sleeping Sickness. [Correspondence.] —*Brit. Med. Jl.* 1921. Nov. 19. pp. 865–866.

——. Trypanocide. [Correspondence.]—*Lancet.* 1921. Nov. 19. p. 1077.

TROPICAL DERMATOLOGY.

DE MELLO (Froilano). *Tricophyton viannai*, **n. sp., the Infecting Agent in a Case of Dermatomycosis.**—*Indian Jl. Med. Res.* 1917. July. Vol. 5. No. 1. pp. 222–233. With 1 plate and 7 text figs. [Received Feb. 1920.]

The patient was a Mozambique soldier with a mycotic eruption in the groin and on the abdomen; the hairs appeared to have escaped infection. Cultural tests revealed the presence of a Tricophyton growing a purplish culture on Sabouraud's media; the organism was submitted to SABOURAUD himself, who regards it, in a note published with this paper, as a new species in his experience. The author contributes a very full description of its mycology.

E. G. Graham Little.

VON BASSEWITZ (E.). **Calôr de figo. (Contribuição ao estudo das dermatomycoses brasileiras.)**—*Arch. Rio Grandenses de Med.* Porto Alegre. 1920. Mar. Vol. 1. No. 2. pp. 55–58.

" Calôr de figo," literally " fig fever," is a dermatomycosis attacking the plantar regions chiefly in coloured individuals who dispense with any foot covering. The author explains the curious name as follows: Calôr, heat or fever, refers to the burning and intense irritation felt by the sufferer. The term " figo " apparently has reference to the fissures on the affected parts, which resemble the cracks on the surface of a thoroughly ripe fig. The affection is of chronic evolution and is common in the country districts of the state of Rio Grande do Sul. The chief clinical features are hyperkeratosis, fissures, depigmentation of the parts affected, and secondary mycoses of the nails. The affection may spread to the palmar surface of the hands. The chief symptoms are pain and itching, worse during the dry season. The pathogenic agent is a fungus of the genus *Trichophyton.*

F. S. Arnold.

ESCOMEL (E.). **Contribution à l'étude de quelques mycoses au Pérou.** —*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 663–671. With 7 text figs.

——. **Contribución al estudio de algunas micosis en el Perú.**—*An. Facul. de Med. de Lima.* 1920. Sept.–Oct. Vol. 6. No. 17. pp. 95–100. With 6 text figs.

The first note describes a case of extensive mycotic eruption in a boy of 15, in the form of red patches from which a fungus was obtained with the botanical characters of Penicillium. The second note deals with a case of trichophytosis limited to the toe-nail of the right hallux, from which a characteristic fungus was demonstrated. The third note relates a case of " onychogryphosis " of all the toe-nails in a lady; fungus was found in scrapings and a culture on carrot allowed of its identification as a Penicillium. The fourth note describes a case of Madura foot, with " white grains " and abundant mycelium.

E. G. G. L.

HORTA (Parreiras). **Sobre um caso de Tinha preta e um novo cogumelo.** (*Cladosporium Wernecki*). [Notes on a Case of Tinea nigra and on a New Organism associated therewith, *Cladosporium Wernecki.*] —*Rev. Med.-Cirurg. do Brazil.* 1921. June. Vol. 29. No. 6. pp. 269–274.

The patient, a white man of 47, presented black patches on the left hypothenar region and wrist and on the right thenar region. Clinically the affection was indistinguishable from that described under the designation Tinea nigra by MANSON in China, and by CASTELLANI and CHALMERS in India, Ceylon and Java. This, however, was not the case with the organism isolated from the black plaques and cultivated with a few colonies of staphylococci. The parasite differed from *C. mansoni*, described and cultivated by CASTELLANI, in its appearance in the scales, and in a yeast-like appearance of its cultures in an early stage of growth. Holding that the organism differs from all similar ones hitherto described, the author names it *Cladosporium Wernecki.*

F. S. Arnold.

DUFOUGÉRÉ (W.). **Les dermato-mycoses de la Guyane française.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 354–357.

Dufougéré reports seven cases of a framboesioid dermatomycosis in the purulent discharge of which an organism was obtained and proved to be a mould with yeast-like bodies and mycelia, which the author regards as probably identical with *Cryptococcus Gilchristi* ("blastomycosis"). No inoculation experiments could be made. Iodide of potassium in large doses produced a speedy cure.

E. G. G. L.

SPAAR (Eric C.). **Notes on** *Monilia metalondinensis* **(Castellani, 1916) and** *Epidermophyton rubrum* **(Castellani, 1909).**—*Jl. Trop. Med. & Hyg.* 1921. May 2. Vol. 24. No. 9. pp. 126–127. With 2 text figs.

The first case was a Singhalese girl, aged 15, with an extensive milky growth on the hard palate, which it almost entirely covered. Cultures obtained from this allowed of the classification with *Monilia metalondinensis* of CASTELLANI. The second case was that of an itchy eruption on the buttocks of a planter. Scrapings showed a fungus and culture on Sabouraud media demonstrated the fungus to be *Epidermophyton rubrum* Castellani.

E. G. G. L.

ROHR (Carlos). **Algumas observações sobre "Otomycose."**—*Arch. Brasileiros de Med.* 1921. Jan. Vol. 11. No. 1. pp. 11–15.

Accounts of nine cases in which mycotic growths were found in the auditory meatus. In three of the cases the organism found was *Aspergillus flavus*; *Aspergillus glaucus* and a new species of Aspergillus were detected once apiece; *Sterygmatocystis niger* was found in three cases, in one associated with *Rhizopus nigricans.* In one case the organism was not identified. The treatment adopted consisted of applications of tincture of iodine after removal of the growths.

F. S. Arnold.

DA MATTA (Alfredo). **Consideraciones sobre un caso de Posadasia coccidioidica. (Blastomicose.)**—*Amazonas Med.* Manaos. 1920. Vol. 3. Nos. 10–11. pp. 41–51. With 1 plate.

After an historical introduction, in the course of which the author claims general priority for POSADAS and states that the first report of a case of coccidial blastomycosis in Brazil was by LUTZ (*Brazil Medico*, 1908), the author details the clinical history of a case occurring in an agricultural labourer of 50.

The disease affected the mouth, tongue, lips, cheeks and cervical region. The ulcerated surfaces caused intense suffering and the patient's general health was much impaired. The patient was treated by intravenous injections of a 10 per cent. solution of iodide of sodium, 2 to 4 grammes of the salt being injected at intervals of two days. Injections of the same solution were also made into the diseased tissues of the face. Disinfection of the oral lesions was carried out by means of nascent iodine by the following method: two solutions were used in succession for rinsing the mouth and gargling, the first consisting of a teaspoonful of a 1:30 solution of sodium or potassium iodide in a tumblerful of water, the second of a dessertspoonful of a 12 vol. solution of hydrogen peroxide in another tumbler of water. Lavage of the nasal fossae was carried out with the same solutions. This treatment was completely successful in bringing about a cure, as is seen in the plate showing photographs of the patient before and after treatment.

F. S. Arnold.

DE MELLO (Froilano). *Epidermophyton salmoneum*, **n. sp., agent d'une épidermophytie inguinale dans l'Inde portugaise.**—*C.R. Soc. Biol.* 1921. Jan. 29. Vol. 84. No. 4. pp. 239–240.

In 35 cases of an inguinal dermatomycosis the author identified the *Epidermophyton cruris* vel *inguinale*. In one case cultures proved the presence of a new species, giving a salmon-coloured growth on Sabouraud media.

E. G. G. L.

GOMES (José Maria). **Dermatophytos:** *Trichophyton rosaceum; Trichophyton equinum.*—*Ann. Paulist. Med. e Cirurg.* 1921. Feb. Year 9. Vol. 12. No. 2. pp. 39–40.

This paper opens with some considerations concerning the parasitic dermatoses observed by the author in the course of three years work in the out-patient department for diseases of the skin at the Santa Casa Hospital of São Paulo, and goes on to give histories of two patients whose symptoms were caused by fungi not commonly met with in Brazil. With regard to the relative frequency of occurrence of different fungi, the author states that *Epidermophyton* and *Trichophyton* were found only in few cases, while Achorion and Microsporon were each responsible for many, the species being invariably, in the former case, *Achorion Schönleini* and in the latter, *Microsporon lanosum.* Of the cases reported the first is that of a Swiss aged 37, whose face, neck and scalp presented numerous scaly erythematous patches. Cultures from the scales in Sabouraud's medium and on potato showed typical growths of *Trichophyton rosaceum.* The second case is that of a German with symptoms of sycosis of the beard. Cultures of the pus in Sabouraud's medium gave ashen-white colonies which were thought at first to be *Trichophyton asteroides.* Sown on potato, however, the pus gave the moist, ochreous streak stated by MATRUCHOT and DASSONVILLE, who first studied and described the organism, to be typical of *Trichophyton equinum.*

F. S. Arnold.

GOMES (J. M.). **Dermatite verrucosa. Um novo caso.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* 1921. Mar.-Apr. Vol. 4. 2nd Ser. Nos. 1-2. pp. 26-27. With 4 plates.

An account of a case of warty dermatitis in which the lesions involved the whole left foot and leg and spread in separate islets up the thigh. Cases of the kind are not uncommon in the interior of Brazil, where its popular name is *formigueiro* (anthill). Cultural experiments led to the identification of the causative organism as *Phialaphora verrucosa.* The four plates show respectively the extensive warty dermatitis involving the patient's left leg, a tube culture of *Phialaphora verrucosa* in glycerinated potato, the same organism *in situ* in the tissues and finally, the fructification of the organism in the hanging drop.

F. S. Arnold.

SILVA (Linneu) **Sobre um caso de ulcera ecthymatoide pre-lacrimal esporotrichosica com lymphangite gommosa da face.**—*Brazil Medico.* 1921. Sept. 10. Year 35. Vol. 2. No. 9. pp. 115-118. With 3 text figs.

Clinical history of a case of gummatous sporotrichosis in a white patient (male) 27 years of age. The primary lesion appeared near the inner canthus of the left eye and spread over the bridge of the nose and on to the upper eyelid. Other typical lesions developed in a chain on the cheek and the submaxillary and pre-auricular lymphatics became enlarged. Culture experiments showed that the organism present was a sporotrichum; species not stated. Potassium iodide, in doses commencing at 30 grains daily and gradually rising to 75 grains, having brought about in a month almost complete disappearance of the lesions, the patience discharged himself from hospital aud failed to report the final result of treatment.

F. S. Arnold.

SRIVASTAVA (A. N.). **Pathology of Ringworm and Allied Skin Diseases.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 213-214.

Srivastava recommends the application of 6-9 per cent. dilute nitric acid in ringworm of the skin.

E. G. G. L.

LUHN (O. G. F.). **Brief Note on the Treatment of Tinea imbricata.**—*Jl. Trop. Med. & Hyg.* 1921. Aug. 1. Vol. 24. No. 15. pp. 206-207.

Luhn found the following formula the most effective in the treatment of *Tinea imbricata* :—acid sal., 1 part ; glacial acetic acid, 1 part ; sp. v. meth., 9 parts.

E. G. G. L.

DE NOOY (J. A.). [In Dutch and English.] **Een geval van autochthone infectie met actinomyces.—A Case of Autochthonous Infection with Actinomyces.**—*Meded. v. d. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 3. pp. 146–155. With 3 plates.

Case of a planter in Java who accidentally cut his foot rather deeply, through putti and boot, with an axe. He applied a first dressing of chewed alang-alang grass (*Imperata exalta*, a native remedy) and then rode home and washed the wound with lysol and dusted it with iodoform. The wound did not heal well, even with rest; but after treatment by a surgeon, who removed a splinter thought to be bone, it closed in about a fortnight.

About a month and a half later there appeared near the scar a swelling which broke and discharged a little serous pus and blood but healed under a sublimate dressing; subsequently, similar swellings running a similar course appeared at intervals of six or eight weeks or even —when work had been unusually easy—of three months.

An operation was at last performed; nothing was found, but the wound did not heal well, and small abscesses formed in its neighbourhood, so that about a month afterwards another operation was carried out which again disclosed nothing remarkable.

Subsequently another swelling formed—indurated and of a blue-red colour—and when this burst actinomyces granules were found in the pus. These were cultivated and cultures were subsequently inoculated into guinea-pigs and mice, to a certain extent successfully, swellings forming which sometimes disappeared and sometimes burst and healed; pus from the latter contained Gram-positive short rods, and when plated on agar ultimately gave issue to typical colonies.

No complement-fixation or agglutinizing substances could be demonstrated in the patient's serum by using suspensions of cultures as antigen.

The patient was treated with potassium iodide, which he did not strictly adhere to, and a relapse occurred after about seven months.

The author considers that the fungus, which is figured, belongs to the same group as *Actinomyces asteroides* of EPPINGER and *A. caprae* of SILBERSCHMIDT.

A. Alcock.

DE MAGALHAES (P. S.). **A propos des mycoses.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 1. pp. 17–22.

De Magalhaes raises a protest against the confused terminology and classification of the Mycetomata, rendered more confused in his opinion by the proposed classification of CHALMERS and ARCHIBALD, who included in the group Actinomycoses. He proposes a new term "mycetosis" to include mycotic affections producing peculiar grains and presenting the aspect of tumours more or less circumscribed. For the moment it is impossible to make a valid classification of mycetoma.

E. G. G. L.

DA SILVA (Pirajá). **Contribuição à micologia parasitária do Brasil (Duas novas espécies de fungos produtores de maduromicose).** [Contribution to the Parasitic Mycology of Brazil.]—*Mem. Inst. de Butantan.* São Paulo. 1918–19. Vol. 1. No. 2. pp. 187–205. With 5 plates. [English summary p. 205.]

Two cases of Madura foot occurring in Bahia are described. The first was a mycetoma with white granules, giving cultural characteristics which the author considers rank it as a new species, which he names *Discomyces bahaiensis.* The second case gave black granules; these also developed cultural characters marking it as a new species of Madurella, which he proposes to name *Madurella Ramiroi.* Experimental inoculation in both cases failed with pigeons, rats and bats.

E. G. G. L.

Montpellier (J.) & Gouillon (P.). **Mycétome du pied (type pied de Madura) dû à l'***Aleurisma apiospermum.—Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 285–290. With 1 plate.

Montpellier and Gouillon report a new case of Madura foot, which was demonstrated to be caused by an extremely rare mould, *Aleurisma apiospermum.* The patient, a Kabyle man aged 35, sustained a slight abrasion of the left foot which developed into a typical condition of mycetoma. Yellowish-white grains were demonstrated which showed when crushed mycelial threads and spores. Cultures were readily obtained on all sorts of media, and these are described minutely. The organism was classified by Prof. Maire as a Deuteromyces and the authors, basing themselves on Vuillemin and Maire, rank it as *Aleurisma apiospermum.*

E. G. G. L.

Montpellier (J.) & Lacroix (A.). **Encore un mycétome du pied, type "Pied de Madura," observé en Algérie, et dû au** *Nocardia madurae.—Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 357–359.

Montpellier and Lacroix report a case of Madura foot in a native Kabyle woman aged 45, in whom yellowish-white grains were demonstrated, and the fungus proved to be Nocardia of Vincent.

E. G. G. L.

Welchman (W.) & Pirie (J. H. Harvey). **A South African Case of Mycetoma ("Madura Foot") caused by** "*Nocardia indica (Discomyces Madurae).*"*—Med. Jl. S. Africa.* 1921. Aug. Vol. 17. No. 1. pp. 6–9.

The patient was a male South African native, aged 66. His right foot was greatly swollen, the swelling having been present for only nine months. He had always lived in the Transvaal. Numerous sinuses opened from the foot and in these a sero-purulent discharge collected in which yellowish white granules were found; these were demonstrated to contain abundant filaments of a Nocardia which subsequent cultural tests proved to have the characters of *Nocardia* or *Discomyces indicà.* The authors emphasize three points of interest. (1) The subinguinal glands were swollen and primary cultures were obtained from them. Glands are rarely thus involved. (2) When the foot was amputated the stump became secondarily infected; this infection was eliminated apparently as a result of injection of novarsenobillon. (3) This appears to be the first recorded case of South African *Nocardia indica.*

E. G. G. L.

BOYD (Mark F.) & CRUTCHFIELD (Earl D.). **A Contribution to the Study of Mycetoma in North America.**—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 215–289. With 18 text figs. and 1 map.

In this admirable review a protest similar to that made by DE MAGALHAES is raised by Boyd and Crutchfield, who also take the view that the category has become too much enlarged by the inclusion of Actinomyces. These authors pass in review all the cases recorded in the United States and in Mexico (30 in all). The practice of walking barefoot would seem to play an important part in etiology. Types of onset do not differ materially from those described in Vandyke CARTER's original memoir of the disease as it occurs in India. Very full descriptions are given of the external and internal changes in the foot, the histology of the skin and the forms of parasite. They report one case as giving a new specimen of growth, and propose to name it *Actinomyces mexicana*. A new species of *Allescheria* is described and figured in the tissues and in culture.

E. G. G. L.

MONTEL (L. R.). **Nodosités juxta-articulaires chez les Annamites. Traitement par le novarsénobenzol.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 554–556.

Montel, with an experience of four cases, states that syphilis was always present concomitantly with the nodules and the latter disappeared with injection of novarsenobenzol.

E. G G. L.

POUPELAIN. **Les nodosités juxta-articulaires. Leur origine probablement syphilitique.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 548–553.

Six cases of this affection are described, in almost all of which there was evidence of syphilis. Novarsenobenzol injections were given and the nodosities disappeared or diminished *pari passu* with the syphilitic lesions. No Wassermann tests were made.

E. G. G. L.

POLIDORI (V.). **Un cas de nodosités juxta-articulaires.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1920. Aug. Vol. 11. No. 2. pp. 53–55. With 1 plate.

The patient was a male Chinese, aged 47, admitted for a tuberculous osteoarthritis, nodosities being also present near the joints. The blood was slightly positive to Hecht-Bauer tests. The patient died in hospital and a postmortem showed extensive tuberculosis. The nodosities were examined for bacteria with negative results.

E. G. G. L.

i. DA MATTA (Alfredo). **Primeiros casos de nodosidades de Lutz-Jeanselme no Amazonas.**—*Brazil Medico.* 1921. July 30. Year 35. Vol. 2. No. 3. pp. 26–28. With 1 text fig.
ii. SILVA (Flaviano). **Nodosidades juxta-articulares de Lutz-Jeanselme.**—*Ibid.* 1920. Oct. 16. Year 34. No. 42. pp. 687–689. With 1 text fig.

i. After a discussion of the question of priority, in the course of which the author states that Adolpho LUTZ has an indefeasible claim to priority in the matter, he having described cases of symmetrically situated juxta-articular nodules occurring in inhabitants of the interior of Brazil as long ago as 1892 [see this *Bulletin*, Vol. 8, p. 238], seven years before JEANSELME's report of cases in Indo-China (Précis de Pathologie Exotique, 1909), the author gives clinical histories of two cases occurring in his own practice. Both recovered, with disappearance of the nodules, under anti-luetic treatment. The question of differential diagnosis is then dealt with, special attention being given, in this connexion, to the consideration of gummata, mycoses and parasitic tumours. The author states his general conclusions as follows :—

1. The juxta-articular nodules of Lutz-Jeanselme should be so named in due homage to LUTZ, the Brazilian savant who first observed them (1892), and JEANSELME, the French tropicalist, who gave a masterly description of them from the clinical and anatomo-pathological point of view.

2. That the nodules are met with exclusively in syphilitic subjects is a fact testified to by F. TERRA (Rio de Janeiro), PAPELAIN (Sze-Chuan), L. R. MONTEL (Saigon), H. FOLEY and L. PARROT (Algiers) and A. da MATTA (Amazonas).

3. The infection of syphilis, therefore, should be recognized as the etiological basis of the nodules. They are para-syphilitic manifestations having their seat in the integuments.

4. Specific treatment and, in many cases, "914" alone, quickly modifies the consistence of the nodules and causes their more or less rapid re-absorption and disappearance.

ii. A description, with figure, of a case of juxta-articular nodosities in a coloured woman of fifty.

[Juxta-articular nodules have been attributed to mycosis and to yaws (DAVEY, MOUCHET & DUBOIS).—ED.]

F. S. Arnold.

FOLEY (H.) & PARROT (L.). **Vingt et un cas de nodosités juxta-articulaires observés en Algérie. Considérations cliniques et étiologiques.** —*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 64–79. With 6 illustrations.
—— & ——. **Nodosités juxta-articulaires chez les indigènes d'Algérie.** —*Bull. Soc. Path. Exot.* 1920. Nov. 10. Vol. 13. No. 9. pp. 738–741.

The authors have observed 21 cases of this condition which they regard as identical with the disease described by JEANSELME in Indo-China. The nodules are rare before the age of 30 years ; they are found chiefly near the larger joints ; the tumours are painless, of cartilaginous consistence, not adherent to the skin, more or less adherent to the subcutaneous tissues. They vary in size from that of a pea to that of a duck's egg and are usually multiple. Usually they undergo no change, but occasionally they soften and break down like gummata.

Histologically, the tumours consist of isolated nodules of fibrous tissue. The blood vessels are often sclerosed and sometimes calcified. The authors regard syphilis as the most probable explanation of the lesions. In one case mercurial treatment was followed by a manifest diminution of tumours. The 21 cases are reported in considerable detail and there is a useful bibliography.

E. G. G. L.

McCord (Carey P.), Kilker (C. H.) & Minster (Dorothy K.). **Pyrethrum Dermatitis. A Record of the Occurrence of Occupational Dermatoses among Workers in the Pyrethrum Industry.**—*Jl. Amer. Med. Assoc.* 1921. Aug. 6. Vol. 77. No. 6. pp. 448–449.

Pyrethrum is an insecticide powder made from the flowers of three varieties of chrysanthemum coming principally from the Caucasus, Persia and Dalmatia. The dermatitis noted in those handling the powder is much worse in the summer owing to perspiration of the workers' bodies. The dermatitis could be prevented by measures of personal cleanliness, and avoidance of contact by improvements in machinery.

E. G. G. L.

Gonçalves (Nicanor Botafogo). **Tratamento da ulcera tropical. O chenopodio como agente antiseptico e cicatrizante.**—*Brazil Medico.* 1920. Apr. 24. Vol. 34. No. 17. pp. 267–268.

The author states that he has had excellent results from the treatment of tropical ulcers by chenopodium and that he finds it to possess very high microbicide and cicatrizing powers. His method is to cover the ulcer with a fine gauze and to let fall on to the latter a few drops of a solution of chenopodium in glycerine (1 minim to each cc.). The method is simple, efficacious and readily available in country districts.

F. S. Arnold.

Howard (Robert). **The Surgical Treatment of Ulcus tropicum.**—*Jl. Trop. Med. & Hyg.* 1920. Sept. 1. Vol. 23. No. 17. pp. 215–216.

The treatment here recommended is scraping away under an anaesthetic all sloughs and softened tissue with a Volkmann's spoon; cutting away ragged edges; washing with antiseptic. The site is packed with cyanide gauze and antiseptic wool and the whole firmly bandaged. The next dressing is made 48 hours after. Thiersch grafting may be necessary in large areas.

E. G. G. L.

Amaral (Afrânio). **Contribuição ao tratamento das úlceras atónicas e fagedénicas. (Do emprêgo do sôro normal sêco.)** [Contribution to the Treatment of the Atonic and Phagedenic Ulcers. The Employment of Dried Normal Serum.]—*Mem. Inst. de Butantan.* 1918–19. Vol. 1. No. 2. pp. 209–231. With 9 plates. [English summary p. 229.]

The treatment recommended is the application to the ulcer of normal dried serum without any antiseptics. Under this treatment in phagedenic ulcer the destruction of the fuso-spirochaetal combination (Vincent's) can be observed and the ulcers cicatrize quickly.

E. G. G. L.

CLÉMENT. **Observation de 35 cas d'ulcère phagédénique des pays chauds.**—*Bull. Soc. française de Dermat. et de Syph.* 1921. No. 2. pp. 64–65.

——, DONATO (Jean) & PARET (Paul). **L'ulcère phagédénique des pays chauds.**—*Ann. Dermat. et Syph.* 1921. 6th Ser. Vol. 2. No. 4. pp. 177–183.

Clément contributes a short paper founded on the observation of 35 cases of phagedenic ulcer in natives. The clinical characters included a cup-like ulceration surrounded by a hard raised edge, filled with necrosed tissue and blood clot, emitting a corpse-like smell, and affecting soft parts, tendons, joints and bones, with little glandular invasion and no ill effect on the general health. In nearly all the cases Vincent's organisms were demonstrated. The joint paper deals with the same series of cases.

E. G. G. L.

NORMET; MARZIN (G.) & GAMBIER (A.); DE GOYON & LE VILAIN. **Traitement de l'ulcère phagédénique des pays chauds.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 107–113.

Normet prefers powdering the ulcer thickly with iodoform, and then passing a red-hot thermo-cautery over the surface until a black crust covers the whole ulcer, which is then dressed with eau d'Alibour (1/3). Cauterization is repeated every two days until healing is advanced.

Marzin and Gambier prefer the method introduced by DUBREUILH, of fitting a sheet of zinc closely into the ulcer and bandaging over it, the patient being kept in bed. If there is much necrotic debris in the ulcer this is removed by wet dressings until the zinc plate can be applied.

De Goyon and Le Vilain advocate treatment by powdering the ulcer with Vincent's powder (Calc. hypochlorite 1, boric acid 9) and bandaging over, leaving the dressing undisturbed for two to three days, or better still, with daily dressings with Dakin's fluid, of which the following formula is given :—

Dry carbonate of soda	140 gm.
Or crystallized do.	400 gm.
Chloride of lime	200 gm.
Ordinary water	10 litres.
Soak, filter and add :	
Boric acid	40 gm.

E. G. G. L.

FOX (E. C. R.). **Naga Sore.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4.. pp. 694–699. With 4 plates.

"Naga sore" is endemic, and sometimes becomes epidemic, in Assam. Clinically it must be classed with "tropical ulcer" or "tropical phagedena." Smears show enormous numbers of fusiform bacilli, with occasional spirochaetes and almost constantly staphylococci, diplococci and streptococci. The fusiform bacilli, probably identical with Vincent's organism, failed to grow on ordinary media, aerobically or anaerobically, but were successfully cultivated by the technique of Krumwiede and Pratt. The spirochaetes resemble morphologically the *Sp. Vincenti*. All cocci were Gram-positive. The epidemics are probably caused by infected flies (*Siphonella funicola*).

E. G. G. L.

Gupta (J. M. Sen). **Cachar Sore and its Treatment.**—*Indian Med. Gaz.* 1921. Jan. Vol. 56. No. 1. pp. 13–15.

Cachar sore (synonyms Naga sore, Assam sore), an ulceration very common in Assam, was investigated by Gupta, who found in the discharge " enormous numbers of bacilli," not identified, and no other organism. Leishman-Donovan bodies were never found, but the author considers that the notable clinical improvement under injection of tartar emetic justifies him in regarding this ulceration as a leishmaniasis.

E. G. G. L.

Edge (B. E.). **Chronic Tropical Ulceration in Europeans.** [Correspondence.]—*Lancet.* 1921. June 18. p. 1327.

Edge, from his experiences in Cocos and Perim, combats the view expressed by Castellani and Stitt that these conditions are " mostly syphilitic," and expresses his conviction that " deficiency " in diet is a more probable cause. A free supply of fresh vegetables and fish reduced the trouble by 50 per cent. in Cocos.

E. G. G. L.

Crichlow (Nathaniel). **Two Cases of Gangosa in Natives of the Solomon Islands, Western Pacific.**—*Jl. Trop. Med. & Hyg.* 1921. Mar. 15. Vol. 24. No. 6. pp. 74–76. With 2 text figs.

The chief interest of this paper lies in the results of treatment. In the first case, an adult male, with the typical ulceration of the nose and upper lip and hard palate, intravenous injection of ½ cc. of colloidal antimony, repeated at three-day intervals, was followed by complete healing within three weeks, but 5 gr. doses of Pot. iod. *ter die* had also been given. In the second case, also an adult male, three doses of 15 cgm. of galyl were followed by complete healing. [No mention is made of any attempt to exclude syphilis in either case.]

E. G. G. L.

Cumming (H. Lovett). **Ulcerating Granuloma of the Pudenda cured by Intramuscular Injections of Antimony Tartrate.**—*Brit. Med. Jl.* 1920. Nov. 20. pp. 775–777.

The patient was an American suffering at the time from a chronic gonorrhoea, as well as from an ulceration of the penis, without any corresponding glandular enlargement. Donovan's corpuscles were found in the ulcer. Intramuscular injections, after a formula given by Castellani and Chalmers, were used :—

Tartar emetic	gr.	viij
Acid. carbol.	♏	x
Glycerine	ʒ	iij
Distilled water to	℥	j

nine minims of this being injected into the buttock at intervals of two days, a mixture (2 drachms *ter die*) of the following formula being at the same time given by the mouth :—

Tartar emetic	gr.	v
Sod. bicarb.	gr.	xxx
Glycerine	℥	j
Aq. chloroformi	℥	ij
Aq.	℥	iij

Healing was evident after the fourth injection and was complete within six weeks.

E. G. G. L.

Pupo (Aguiar). **Granuloma venereo, seu tratamento especifico pelo tartaro emetico.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1920 & 1921. Oct.–Feb. Vol. 3. (2nd Ser.) Nos. 8–12. pp. 294–298.

The chief feature of interest in this paper is the description of the treatment of Granuloma venereum by endovenous injections of tartar emetic as carried out in Brazil by Gaspar Vianna and Aragao. The drug is given dissolved in physiological saline, the dose varying from 0·05–0·12 cgm. in 5–12 cc. The injections are administered every other day, commencing with 5 cc. and increasing by 1 cc. at each injection until a dose of 10 cc. is reached. The secretions are diminished from the commencement of the treatment, and cicatrization commences both at the margin and in the centre of the ulcers with the fourth injection, proceeds rapidly, and is generally complete after from 15 to 25 injections. Donovan's corpuscles disappear from the lesions before cicatrization is complete.

F. S. Arnold.

Campbell (Meredith F.). **Granuloma inguinale.**—*Jl. Amer. Med. Assoc.* 1921. Mar. 5. Vol. 76. No. 10. pp. 648–651. With 4 text figs.

Campbell reports five cases, all in negroes, in four of whom an encapsulated bacillus was demonstrated. Treatment by intravenous injection of 1 per cent. tartar emetic was practised in all, but the author could only record one " cure."

E. G. G. L.

Giblin (W. E.). **Tartar Emetic for Venereal Granuloma.**—*Brit. Med. Jl.* 1921. June 25. p. 932.

Giblin claims to have treated 84 cases of this condition in eight months, with completely satisfactory results, using intravenous injection of tartar emetic (1 per cent.), 10 cc. given twice weekly for 10 injections. After an interval of ten days, five more injections are given.

E. G. G. L.

REED (W. A.) & WOLF (Monroe). **Preliminary Report on Treatment of Granuloma inguinale with Exhibit of Cases.**—*New Orleans Med. & Surg. Jl.* 1921. July. Vol. 74. No. 1. pp. 25–35. With 5 text figs.

A brief but very useful survey of the views on the bacteriology of this condition precedes the consideration of the authors' cases. The disease has probably existed, unnoted, in the United States for many years; it occurs practically only in the coloured race and is usually mistaken for syphilis. The clinical symptoms are nearly always the same: it begins with one or more small, very slightly indurated papules which soon break down, leaving a red granulated area with a slightly elevated surface and edges and very little induration. Involvement of glands practically never occurs. The usual site of the disease is the genital area, but it may occur on the face and neck, and in one of the authors' cases was noted in the mouth. The duration is always chronic. No treatment can compare in efficacy with intravenous injection of tartar emetic. Five cases are described in detail.

E. G. G. L.

LYNCH (Kenneth M.). **Granuloma inguinale (Granuloma venereum; Granuloma of Pudenda; Ulcerative Vulvitis; Serpiginous Ulceration of Genitals, etc.).**—*Jl. Amer. Med. Assoc.* 1921. Sept. 17. Vol. 77. No. 12. pp. 925–929. With 11 text figs.

Lynch reports nine cases from Charleston, S.C., under the general title Granuloma inguinale. Three of these (two negroes and one white) were uncomplicated cases in which Donovan bodies were abundantly present. In the other six cases Donovan bodies were found, but there was evidence as well of syphilis in five cases and microscopical evidence of epithelioma in one. Injections of tartar emetic were successful in the three first cases, but in the other cases failed to influence the concomitant disease, which called for other treatment.

E. G. G. L.

TAMURA (Harukichi). **On Creeping Disease.**—*Brit. Jl. Dermat. & Syph.* 1921. Mar. & Apr. Vol. 33. Nos. 3 & 4. pp. 81–102; 138–151. With 6 figs (2 plates).

This is a very important paper, the author having succeeded in extracting a live animalcule from the lesion, identified as Gnathostoma. The patient was a Chinese woman and the linear lesion was found on the right chest. The parasite was extruded from the advancing extremity of the line; it was 9 mm. long and 1 mm. wide; placed in human serum it made active movements for half an hour. Section of the linear lesion showed the tunnel excavated by the parasite to be chiefly in the epidermis but partly in the corium. The Gnathostoma was probably to be identified with *Gnathostoma siamense.* A very full review of the literature is given. [See also this *Bulletin,* Vol. 18, p. 116.]

E. G. G. L.

KLAUDER (Joseph Victor) & GREENBAUM (Sigmund S.). **Creeping Eruption (Larva migrans). Report of Case contracted at Wildwood, New Jersey.**—*Arch. Dermat. & Syph.* 1921. Apr. Vol. 3. No. 4. Pt. 1. pp. 377–382. With 5 text figs.

The patient was a little American girl aged six years; she had been playing in the sea sand of New Jersey, where the disease was probably contracted. Raised erythematous linear lesions were found on each foot, in which the larva could be seen by diascopy, but could not be recovered. The condition was cured within five days by the application of tincture of iodine to the linear lesions.

E. G. G. L.

KETRON (Lloyd W.). **A Note on the Treatment of Larva migrans.**—*Arch. Dermat. & Syph.* 1921. Sept. Vol. 4. No. 3. pp. 368–369.

Ketron reports a case in a young man, acquired apparently while wading in sand in New Jersey. Two larval burrows were identified and were satisfactorily dealt with by freezing with ethyl chloride (one application).

E. G. G. L.

DYSON (William). **Camel Itch.**—*British Jl. Dermat. & Syph.* 1921. Mar. Vol. 33. No. 3. pp. 107–108.

An epidemic of a pruriginous eruption occurring among the personnel of a Camel Corps was investigated by the author. Preparations from the human skin revealed the female parasite occupying a hair follicle; the male parasite was not found. In scrapings from the camel male and female parasites resembling, but smaller than, the *Acarus scabiei* were easily found.

E. G. G. L.

MONTPELLIER (J.), DEGOUILLON & LACROIX (A.). **Note complémentaire sur la gale filarienne et son évolution.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 211–214.

The authors examined 800 Senegalese native troops, 156 of whom were carriers of mother-tumours of *Onchocerca volvulus*, or attacked by filarial itch; 150 of the 156 were in the latter class; 98 of the 150 had filarial cysts; only six of the 156, though carrying mother-tumours, had no eruption. The inference is therefore drawn that the presence of Onchocerca determined the eruption.

E. G. G. L.

LAWRENCE (Herman). **The Pathogenicity of the Demodex (Owen) in the Human Being.**—*Med. Jl. Australia.* 1921. July 16, 8th Year. Vol. 2. No. 3. pp. 39–40.

The author very much doubts the general belief that Demodex is innocuous to man. As long ago as 1912 he exhibited at Rome a model of an impetiginous eruption which he attributed to Demodex. He has been consulted in cases resembling incipient lupus erythematosus, pityriasis alba, and molluscum contagiosum, where these conditions could be ascribed to the presence of this acarine and were removed by appropriate parasiticide treatment; and all his studies lead him to the conclusion that infestation with Demodex may be recognized in at least three degrees to which he would apply the terms "demodex impetigo," "demodex rosacea," and "demodex cysticum." He is not certain that the species harmful to man is always *D. folliculorum*.

A. A.

LLAMBIAS (J.) & LORENZO (D.). **Dermatose causée par un parasite du blé.**—*C.R. Soc. Biol.* 1920. Dec. 4. Vol. 83. No. 35. p. 1528.

Men dealing with sacks of wheat, in Cordoba and Santa Fé, in the month of March, suffered from an intensely irritant form of dermatitis, caused by the Tarsonemid mite *Pediculoides ventricosus*. The mites teemed in such numbers as to form a layer a centimetre thick on some of the sacks.

A. A.

STRANDBERG (J.). **Regarding an Unusual Form of Migratory Erythema caused by Tick Bites.**—*Acta Dermat.-Ven.* 1920. Dec. No. 3–4. p. 422. [Summarized in *Arch. Dermat. & Syph.* 1921. July. Vol. 4. No. 1. p. 101.]

In this case—a little girl apparently bitten on the nipple—the nipple when seen two months afterwards was enlarged and infiltrated and surrounded at a radius of about four inches by an erythematous ring. There were also some slight and painless nodules in the neighbouring axilla.

A. A.

VAN SACEGHEM (René). **Le traitement du Pyosis tropica au Ruanda.**—*C.R. Soc. Biol.* 1921. Feb. 5. Vol. 84. No. 5. pp. 282–283.

The author has constantly found a staphylococcus in this condition, and an autogenous vaccine administered in increasing doses has proved the best means of treatment.

E. G. G. L.

SIMON (Keith M. B.). **Ainhum, a Family Disease.**—*Jl. Amer. Med. Assoc.* 1921. Feb. 26. Vol. 76. No. 9. p. 590. With 1 text fig.

Keith Simon says that ainhum is fairly common in British Honduras. He reports a case in which the father and mother of the patient were also suffering from the same condition, the toe being lost in all three patients.

E. G. G. L.

KOJIMA (S.) & DO-KIN (Chin). [**On Ainhum.**]—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1921. Mar. 30. No. 215. English summary pp. 2–3.

The authors report a case in a Chinese male, aged 35, a labourer in the fields, used to walking barefoot. The little toes of both feet were affected.

E. G. G. L.

PARROT (L.). **Sixième observation algérienne de Xeroderma pigmentosum.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 80–81.

Parrot records another case of Xeroderma pigmentosum occurring in Algeria, in the person of a native boy, aged 14, with no family history of the disease. Pigmentation had begun six to seven years previously, and occupied the forehead, ears, neck, chest, abdomen and thighs.

There was atrophy of the skin of the ears, lower eyelids and upper lip, nose, and the nasal and buccal mucosa. Some of the nails were thickened. Dentition was normal. There was a small (?) cystic tumour near the left eye.

E. G. G. L.

DUBREUILH (W.). **Prurigo épidémique chez les asiatiques importée pendant la guerre.**—*Ann. de Dermat. et de Syph.* 1920. 6th Ser. Vol. 1. No. 1. pp. 13–16.

Dubreuilh was able to watch an extensive epidemic of a pruriginous eruption in Annamites admitted to Military Hospital 27 during the war. The affection was at first mistaken for scabies. The eruption consisted of urticarial papules which were much scratched; it occupied the lower part of the trunk, and especially the lumbar region, but would invade the whole body except the face, hands, feet and genitals; and as a rule the flexures. There was usually some pigmentation left when the rash disappeared. Glandular enlargements were severe and frequent. The most careful search for parasites was unsuccessful. The condition did not seem to be infectious. The treatment which succeeded best was the application of an ointment: Sulph. precip. 10 gr., Vegetable tar 10 gr., Lard 100 gr., combined with a daily bath.

E. G. G. L.

PINOY (E.). **Traitement de la pelade et considérations sur son étiologie.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 280–281.

Pinoy, without producing any evidence for his opinion, regards Alopecia areata as a parasitic disease and claims to have succeeded in producing excellent results with local antiseptic treatment.

E. G. G. L.

DECROP & SALLE. **Observation de mycosis fongoïde chez un indigène marocain.**—*Bull. Soc. française de Dermat. et de Syph.* 1921. No. 4. pp. 148–149.

Decrop and Salle describe a case of this rare dermatosis in a male native, aged 50. The affection began with the characteristic erythematous rash attended by intense itching, and later tumours developed and generalized infiltration of the skin. Blood counts showed a normal leucocytic formula but a larger number of transitional forms. The patient was treated with injections of N.A.B., but was soon lost sight of.

E. G. G. L.

CHALMERS (Albert J.) & GIBBON (E.). **The Keratosis pilaris of Jackson and Brocq in the Anglo-Egyptian Sudan.**—*Jl. Trop. Med. & Hyg.* 1921. May 2. Vol. 24. No. 9. pp. 121–126. With 3 plates.

The authors describe two cases of a follicular keratosis as difficult to classify, from the description, as the follicular eruptions are notoriously difficult of differentiation. The second case is said to have been "rapidly cured under tonic treatment," a fact which almost certainly removes it from the category of Keratosis pilaris, which is a synonym for a variety of Icthyosis and is very little influenced by treatment.

E. G. G. L.

i. CHALMERS (Albert J.) & MACDONALD (Norman). **Some Cosmopolitan Sudan Skin Affections.**—*Jl. Trop. Med. & Hyg.* 1920. June 15. Vol. 23. No. 12. pp. 150–152. With 1 plate.

ii. —— & ——. **Some Cosmopolitan Sudan Skin Affections. II. Molluscum contagiosum. III. Cheilitis exfoliativa. IV. Melanosis lingualis.**—*Ibid.* 1921. Mar. 15. Vol. 24. No. 6. pp. 69–74. With 2 plates.

i. The paper describes two cases of Herpes iris in dark-skinned patients, with a somewhat unusual distribution, viz., on the forehead, in the first case, but otherwise without special interest.

ii. The authors have made a careful study of two cases of Molluscum contagiosum occurring in black-skinned patients, but have failed to make any new contribution to our knowledge of the disease. They regard Cheilitis exfoliativa as being " far from rare " in the Sudan, and found reason, in the case recorded, to ascribe its causation to seborrhoea. Under the not too happy title of Melanosis lingualis they describe a condition commonly met with in natives, a granular hyperpigmentation of the tongue, which can hardly be regarded as pathological.

E. G. G. L.

CHATTERJI (Karuna K.) & CHARUBRATA RAY. **Observations on Margosic Acid and its Salts and their Use in Cases of Syphilis and Skin Diseases.**—*Indian Jl. Med. Res.* 1918. Apr. Vol. 5. No. 4. pp. 655–674. With 3 plates. [Received Feb., 1920.]

Margosic acid and its salts are derived from the margosa tree, the Bengali Nim, the Hindu Nimb. The drug has been in use in India from the earliest times. Careful chemical and biological tests were carried out by the authors. A very bitter alkaloid was obtained by alcoholic extract from Nim oil, from which margosic acid is prepared. Sodium and potassium margosate are soluble salts. They proved useful in the treatment of syphilides, and in the few cases of scabies, eczema, " pemphigus " and psoriasis in which they were tried by the authors.

E. G. G. L.

BOOK REVIEWS.

VON PROWAZEK (S.) [the late]. **Taschenbuch der mikroskopischen Technik der Protistenuntersuchung. 3te. Auflage, vollständing neu bearbeitet von Dr. V. Jollos.** 96 pp. 1922. Leipzig: Johann Ambrosius Barth. [Price Mk. 18.]

The third edition of this little pocket-book, originally devised by the late S. von Prowazek for the use, primarily, of medical men, has been completely revised and re-edited by V. Jollos. In his preface the present editor says that, in addition to the requirements of medical men, those of zoologists have now been taken into account, particularly as regards the technique requisite in connexion with the free-living Protozoa. More attention has been paid, also, to the methods of cultivation in view of the growing importance of this branch of the subject.

The plan adopted is to give, first, a short, general introduction to microscopical technique and the making of observations on the living forms, followed by a selection of the more important methods of fixation and staining. The body of the work is occupied by a consideration of suitable methods for the various classes and groups, treated *seriatim*. While this plan has certain obvious advantages, it involves, unavoidably, an undue amount of repetition and the necessity for much cross-reference. Thus, to give one instance, the method of fixation by the vapour of osmic acid plus a few drops of acetic acid is most valuable for preserving Trypanosomes in blood-smears in what is most nearly their correct size and form, but beyond a brief mention of the use of 2 per cent. osmic acid (p. 45), the method is not fully described until Appendix 1, p. 82; even then the mode of procedure recommended is by no means the best to follow in making use of this method. The Protista, apart from the Protozoa, are dealt with in two appendices, the first of which treats of the Spirochaetes, the other of the "Chlamydozoa," etc.

Naturally, it cannot be expected that a small manual should be in any respect exhaustive of its subject, but it is strange that there is no mention of Leishman's stain, which is so well known for its value as a rapid method for combined fixation and staining of blood-parasites. And another omission that ought to be rectified in a future edition is that of any reference to Twort's stain, which is of considerable service, both for Amoebae and blood-parasites.

The subject of the literature is poorly and unequally handled. For no particular reason that we can discover, some of the references are given in the text, others in short lists appended to the various groups. To judge from those that are given it might be imagined that nearly all the important work on this subject had been done in Germany. We are surprised to find no reference, for instance, to the standard paper on Trypanosome cytology in relation to technique which was published by the late Prof. E. A. MINCHIN.

We cannot say that we have found the book easy or attractive to read; its study would have been greatly facilitated by the insertion of many more cross-headings, in more conspicuous type, to distinguish between the different subsections, such as manipulation, fixation and staining. But the little volume contains a quantity of useful information compressed within its limits and should prove of assistance to those who readily read German.

H. M. Woodcock.

HEWLETT (R. Tanner) [M.D., F.R.C.P., D.P.H., Professor of Bacteriology, University of London] and NANKIVELL (A. T.) [M.D. (Lond.), D.P.H. (Camb.); Medical Officer of Health and School Medical Officer of the Borough of Poole]. **The Principles of Preventive Medicine.**—pp. 512. With 12 charts and 5 diagrams in the text and 3 appendices. 1921. London: J. & A. Churchill. [Price 18s. net.]

In a manual of about 500 pages Professor Tanner Hewlett and Dr. Nankivell have embodied a very large amount of information on public health work. Although entitled "The Principles of Preventive Medicine" the book contains useful advice regarding the putting of these principles into practice, as well as concrete examples of various public health activities in this country—see, for instance, the sections on "The public health service in relation to the general practitioner" and "Arrangements for dealing with special cases" in Chapter II, "The prevention of infant mortality," Chapter IV, and "The control of smallpox," Chapter XV, and of diphtheria, Chapter XVII. Though the book is based upon English experience, yet, as an up-to-date exposition of preventive medicine as practised in a highly civilized and industrial country, it is nevertheless of considerable value to workers in tropical countries, both medical and lay, not only as furnishing ideals to be aimed at, but also as demonstrating the value of the practical application of measures the principles of which are the same all the world over. Moreover there are many large towns and cities in the tropics in which even the most advanced measures here described might be carried out with advantage. Although the chapter (Chapter II) on the outline of English Local Government might not at first sight appear to have any special interest for medical men in the tropics, it will, it is believed, be of great use to such as are called upon to give advice upon the organization of public health work, either *ab initio* or in its later developments; for it traces in outline public health organization in England from its beginnings in the parish to its culmination in the Ministry of Health, and it may safely be said that, with proper regard to local conditions, no better model than our English system can be found upon which to base public health administration in any part of the world. The great value of such a model to workers in countries where sanitation is less advanced than here is that it represents a system which has been gradually evolved from small beginnings and has been at every point the object of careful study and vigorous criticism. The chapters dealing with Eugenics, Maternity, the Care of Infants and Childhood, and the Health of Adolescents and Adults may perhaps seem caviare to many workers in the tropics, but there will also probably be many who will be glad to gather from them hints, for example, on the establishment of maternity centres or on the organization of the medical inspection of school children.

It is of course necessary in a manual concerned with preventive medicine as a whole to include chapters dealing with building sites, dwelling-houses, and the housing problem generally. It is, however, refreshing to one familiar with the older text-books on hygiene and public health, which were largely concerned with such subjects as the velocity of air currents, the hydraulic mean depth of sewers, and the construction of water closets, to find that the authors of this manual have realized that such subjects are better dealt with by architects and engineers, and have referred their readers desiring to learn practical details of house drainage to plumbers. To say this is in no way to disparage the earlier writers, who were pioneers in days when it was necessary for medical men to explain in some detail matters which may now be left to the sanitary engineer.

The chapter on "Water Supply and Public Health," in spite of the importance which the authors rightly attach to this subject, is somewhat disappointing. It is true that this is a subject with which the engineer is largely concerned, but more might have been expected in a book of this kind on the examination of water, both chemical and bacteriological, especially as regards its interpretation, and on the safeguarding and purification of water supplies. It is satisfactory, however, to observe the opinion that "in a properly chlorinated town supply *B. coli* should never be discoverable"; the same, of course, applies to any chlorinated supply for human consumption. The advice that before deciding to condemn a water on chemical or bacteriological grounds several samples should be taken and local circumstances investigated is very sound, as is also that on the routine examination of water supplies as a practical check on the efficacy of the methods used for their purification.

An interesting account of the "germ theory" of disease is given in Chapter XIV, which also deals in brief though instructive outline with epidemiology, immunity, and the diseases and parasites of lower animals communicable to man. Some brief reference is also made here to the measures for preventing such infections. Chapter XV deals in more detail with certain diseases, and the parts relating to smallpox and typhus fever are likely to be of special interest to medical men in the tropics. Sound advice is given with regard to the prevention of smallpox, the paramount importance of vaccination and revaccination and their application to all possible contacts being rightly insisted upon. No mention, however, is made of alastrim or of the greater virulence of the Eastern than of the Western strain of smallpox, nor among the measures for dealing with an outbreak of smallpox is there any reference to the compulsory notification of chicken-pox. The remarks on typhoid fever, although they are stated to apply to infections with the paratyphoid A and B organisms, contain but slight reference to them. No mention is made, for instance, of the fact, which is of considerable importance from an epidemiological point of view, that infection with *B. paratyphosus* A, though common in the East, is but rarely met with in this country, nor of the usually milder course of illness resulting from paratyphoid infections. The speculation as to the possible transmutation of *B. coli* into *B. typhosus*, although interesting, is somewhat in advance of present knowledge. Chapter XVI deals with Tuberculosis and Venereal Disease, the latter common to all parts of the world, and the former already so wide spread as to render the remark that " Tuberculosis may become one of the problems of the tropics " a very belated prophecy. It is to be feared that many of the measures advanced for the prevention of both of these diseases, however admirable they may be in themselves, require a higher individual regard for the public health than is as yet noticeable among the inhabitants of most tropical countries.

A short though useful and up-to-date account of the methods of producing artificial immunity is given in Chapter XVIII, and the elements of vital statistics are ably presented in Chapter XXI.

E. Wilkinson.

BECK (Conrad). **The Microscope. A Simple Handbook.**—144 pp. With 131 text figs. First Edition. 1921. London: R. & J. Beck, Ltd., 68, Cornhill, E.C. [Price 2s. 6*d*. net.]

A small handbook on the microscope, which, although quite elementary, deals with many practical points that beginners are apt to ignore. Mr. Conrad Beck describes, in simple language, the various parts of the microscope. The account which he gives of the substage condenser, and of the different forms of illuminating apparatus, is very clear and instructive; it includes a good description of the " Pointolite " lamp, and some references to the employment of colour-screens. Chapter V, which deals with object-glasses and eyepieces, contains matter which is often imperfectly understood, even by those who have used a microscope for some time; it is well, for instance, to emphasize, as Mr. Beck has done, the importance of adjusting the tube-length accurately to that for which the lenses are designed, and to point out the influence of the thickness of the cover-glass upon the performance of the objective. Brief descriptions are given of most of the microscope-stands, lenses and apparatus manufactured by Messrs. R. and J. Beck. The author has scarcely dealt at all with optical theory; but states in his preface that he hopes, at a later date, to publish a further volume on this subject.

The book is well printed, and the price is moderate.

H. J. Walton.

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TUBERCULOSIS IN THE TROPICS:

A REVIEW OF RECENT WORK.

By Col. S Lyle Cummins, C.B., C.M.G., M.D., D.T.M. & H. (Cantab.), A.M.S. (retd.), Professor of Tuberculosis, University College of South Wales.

Sectional Editor, Tropical Diseases Bureau.

Epidemiology.

In the *Tropical Diseases Bulletin,* Vol. 17, No. 1, of January 15, 1921, was reviewed the most notable contribution to the subject of tropical tuberculosis that has appeared in recent years. This book, entitled " A Study in the Epidemiology of Tuberculosis with Special Reference to Tuberculosis in the Tropics and of the Negro Race," is by Colonel George E. Bushnell, United States Army Medical Corps, and presents within one small volume the conclusions drawn by the author from a rich clinical experience of the disease. The opinion to which Colonel Bushnell is brought by close observation and prolonged study is that the natives of isolated areas in the Tropics and elsewhere owe their marked susceptibility to tuberculosis to the absence of acquired resistance. In this respect they are comparable to the infants and young children born in less primitive communities, and are liable to present the infantile type of generalized tuberculosis rather than the chronic pulmonary type characterized by a slow progress and a middle age death-rate, usually met with amongst the members of the industrial communities of Western Europe and the United States. In his observations as to clinical type amongst infected American Indians, Colonel Bushnell is in complete accord with the experience recorded by A. Borrel as the result of his observations upon tuberculosis amongst the African troops brought to France during the Great War, an account of which is given in this *Bulletin,* Vol. 16, pp. 190–2. This important conception of the epidemiology of tuberculosis is not new, having been enunciated by Metchnikoff and his co-workers in 1911, as well as by Calmette, Sanarelli and others. A notable communication on similar lines was made by H. Ziemann to the *Centralblatt. f. Bakteriologie* in 1913 [see this *Bulletin,* Vol. 3, pp. 232–33]. Similar views have recently been voiced by Cummins in a paper entitled " Tuberculosis in Primitive Tribes and its Bearing on the Tuberculosis of Civilised Communities " in the *International Journal of Public Health* [see this *Bulletin*, Vol. 18, p. 62]. The publication of Colonel Bushnell's volume, so complete in its analysis of tuberculosis of the American Negro and of the American Indian, focuses attention in the clearest manner on this aspect of tuberculosis, and his book for this reason is certain to be of historical importance.

The lead given by Borrel in the study of tuberculosis amongst the tropical levies imported into France during the war has been successfully followed up by other observers, who have added still further to our knowledge on this subject. Amongst the more important of these are the papers by Ch. Roubier [this *Bulletin*, Vol. 18, p. 64], and by L. Moreau [*loc. cit.*, p. 63], the latter giving an excellent account of the X-ray appearances in tuberculosis in Africans manifesting the disease in France. The chief interest of the paper by Roubier lies in his comparison of tuberculosis amongst different racial groups represented by the Algero-Moroccan troops, the Senegalese levies, and representatives of ancient civilization, such as the inhabitants of Indo-China. The Algero-Moroccans, exposed in their own country to a considerable degree of contact with Europeans, show in their clinical types a considerable degree of approximation to European tuberculosis ; the Senegalese, detached from their isolated native surroundings, tend to exemplify what is known as the infantile type of infection ; while the Indo-Chinese, living in large native agglomerations but not in touch with Europeans to any considerable extent, tend to react to tuberculosis somewhat after the manner of the growing children of Western Europe, and are thus intermediate between the Senegalese and the Algero-Moroccan levies.

To the same effect are the observations of Trabaud in his Memoirs of Tuberculosis in the Army and in Native Troops [this *Bulletin*, Vol. 18, p. 385]. Here, too, the extreme susceptibility of the African tribes is noted ; while the observation is made that the Arabs show, on the whole, a higher resistance than the natives of Senegal, although they are far less protected than Europeans.

Similar phenomena are recorded from Morocco by Colombani and Vuillet, whose papers are noticed in this *Bulletin*, Vol. 18, p. 384.

The important contributions of Carbonell and A. Fontes [*loc. cit.*, pp. 66 and 386] show that the same influences are at work in the Argentine Republic and Brazil.

Pathology.

A paper of the highest importance upon tuberculosis in the Tropics, and indeed upon tuberculosis in general, from the pen of Dr. H. H. Scott, appears in the *Annals of Tropical Medicine and Parasitology*, Vol. 15, No. 3, of September 30, 1921, and a full summary of this work, both as recorded in the paper referred to and also in a slightly fuller manuscript report, dated June 8, 1921, and received from the Colonial Office, appears in this *Bulletin*, Vol. 18, pp. 376–9. This work is founded upon an analysis of the post-mortem findings in 300 consecutive cases of death from tuberculosis, with special reference to the disease as met with in children in Hong Kong. On the whole the findings of Dr. Scott correspond with those of Gohn and of Canti. Scott, however, notes a certain number of cases in which tuberculosis of the glands at the hilus or in the mesentery was found to be present although no focus could be discovered in the lung or in the intestine. These cases however were exceptional and, as a rule, a lung focus was found corresponding to the gland infection at the root, while intestinal ulceration was found to have occurred in the areas drained by lymphatics leading to enlarged mesenteric glands.

Treatment.

The researches that have led to recent discoveries bearing upon the treatment of leprosy by means of the unsaturated fatty acids of chaulmoogra and other oils, and by the ethyl esters of these acids, have naturally had their repercussion upon the treatment of tuberculosis; and the work of ROGERS, MUIR, DEAN, MCDONALD and others has been applied to the tubercle bacillus. So far there are no conspicuous successes to record, but some highly important observations by WALKER and SWEENEY, and by LINDENBERG and RANGEL PESTANA, with regard to the effects of these preparations upon acid-fast bacilli *in vitro* have been reviewed in this *Bulletin*, Vol. 17, p. 277, and Vol. 18, p. 390. WALKER and SWEENEY demonstrate clearly that the unsaturated fatty acids of chaulmoogra oil have a specific bactericidal action upon acid-fast bacilli. They associate this specific action with the fact that the acids of this series differ from all other known fatty acids in that their atoms are arranged as a closed carbon chain or ring. These acids, while without harmful effect on the bacillus coli and similar organisms, are capable of killing the bacillus of rat leprosy in 24 hours, even when diluted to 1 : 75,000; while they prevent the growth of tubercle bacilli in a concentration of 1 : 10,000. In these observations lies some hope for future progress, but there seems reason to think that the greater toxicity of the tubercle bacillus as compared to the bacillus of leprosy is likely to make the new preparations less applicable to the treatment of the former than of the latter disease.

Several communications relating to the tuberculosis of miners in the Commonwealth of Australia and in South Africa have been reviewed in this *Bulletin*, Vol. 18, No. 5. These papers, though more important from their bearing on industrial than on tropical tuberculosis, deserve careful study, especially where they relate to the African natives employed in the mines of the Transvaal. It is sufficient to say that the papers so far received are unanimous in calling attention to the great susceptibility of African natives to rapid and progressive infections with the tubercle bacillus when brought into association with European miners, and the trouble appears to be accentuated by the inhalation of the silica dust which so frequently occurs in the mining industry.

LEISHMANIASIS: A REVIEW OF RECENT LITERATURE.

By C. M. WENYON,
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II. ORIENTAL SORE.

The chief advances which have been made in our knowledge of oriental sore fall into three categories. Firstly, there is the gradual accumulation of evidence that species of Phlebotomus may be the carriers of the disease, at least in the Old World; secondly, the wide distribution of leishmania infections in South and Central America, where an exceedingly chronic disease exists, which, though mostly of the cutaneous variety, in 10 to 20 per cent. of the cases extends to the naso-pharynx; thirdly, the great advance made in the treatment of the disease by the discovery of the specific remedy, tartar emetic.

Distribution.

The most remarkable feature of the distribution of oriental sore is the well-known fact that in certain countries the endemic centres are sharply marked off from those of kala azar. In India, oriental sore occurs in the districts north-west of a line joining Cambay and Delhi, while kala azar is found only east of this line. A similar condition maintains in North Africa, where kala azar is found in the districts round Tunis, while oriental sore is found chiefly at Gafsa, about 2 degrees further south. Recent records show that this distribution still maintains. In other areas it appears that such a demarcation does not exist. Both kala azar and oriental sore occur in the districts around the Caspian Sea, VON PETERSEN (1914) having obtained details of 1,200 cases in Turkestan. The same is very largely true of the Mediterranean littoral, and of the Blue Nile districts of the Sudan.

Oriental sore in the Eastern Hemisphere has a wide distribution in the part of India already indicated, Arabia, Persia, Mesopotamia, the Caspian region and, generally speaking, all the countries bordering on the Mediterranean. MARTOGLIO (1912) has recorded the disease from Abyssinia, while WAGON (1914) has seen it in Dahomey, in Nigeria, and BOUILLIEZ (1917) in the French Congo. The disease had previously been noted in the Niger district by STÉVENEL (1911) and BENOIT-GONIN (1911). The most interesting recent observation is that of RAVAUT (1920), who has diagnosed a case in France in a girl who became infected at Beixas in the Eastern Pyrenees. Another case reported by the same observer appears to have originated in Spain, where the disease was first recorded by CAMACHO (1914).

CASTELLANI (1913) reported a case of oro-pharyngeal leishmaniasis in Ceylon, while similar cases have been recorded by CHRISTOPHERSON (1914) and SUSU (1917) from the Blue Nile district of the Sudan. These are of interest in that they exhibit a type of the disease which is common in South America, but exceedingly rare in the Old World, where the lesions are almost exclusively of the cutaneous variety.

Since the discovery by LINDENBERG (1909) and CARINI and PARANHOS (1909) of leishmania in the ulcer of Bauru in Brazil, and the demonstration by CARINI (1911) of the presence of the parasites in the nasopharyngeal lesions, which are often associated with the cutaneous condition, numerous records of the distribution of the disease in South America have been published. It has a wide distribution throughout Brazil, but the whole of the northern half of South America and Central America contain endemic centres of the disease, which is especially prevalent in the virgin forest regions which are in process of development in connexion with new railway construction. It must not be supposed that involvement of the mucosa of the nose, mouth and pharynx occurs in every case of leishmania infection in South America. In Brazil, according to DA SILVEIRA (1920), this condition occurred in 20 per cent. of 15,000 cases seen at S. Paulo between 1914 and 1919. INCHAUSTEGUI (1918) finds that in certain parts of Mexico amongst the chicle gum gatherers there may be an incidence of dermal leishmaniasis of 50 per cent., the ear being the most common site of the lesion. The disease had previously been reported from Yucatan by SEIDELIN (1912) and RODRÍGUEZ ARJONA (1915). BATES (1913) has, however, recorded a case from Panama, which showed involvement of the nasal mucosa. In the Guianas the disease, which is known as Forest Yaws, Boschyaws or Pian Bois, and was first shown to be due to leishmania by NATTAN-LARRIER, TOUIN and HECKENROTH (1909) and FLU (1911), seems to be limited almost exclusively to the skin. THÉZÉ (1916) pointed out that the mucosae were rarely affected and that spontaneous healing of the cutaneous sores occurred in 2 or 3 years. BONNE, however (1918), has seen cases in Guiana in which the nasal mucosa was involved. ITURBE (1917) first recorded the disease from Venezuela. It has been studied in Colombia by TEJERA (1920), who finds that the mucosae are rarely affected. MIGONE (1913) and LINDSAY (1914) have described the disease from Paraguay; STRONG and his co-workers (1913) met with cases in Peru, while ESCOMEL (1917) gives an account of the disease as it occurs in Peru and Bolivia.

Natural Disease in Animals.—Though many observers had noted that dogs are liable to an ulcerative condition of the head in endemic centres of oriental sore, it was not till 1913 that NELIGAN demonstrated leishmania in these lesions in dogs in Teheran. In one dog there appeared to be a general infection at the same time. GACHET (1915) observed ulcers in 15 of 21 dogs examined at random in Teheran. Leishmania were found in these lesions. YAKIMOFF and SCHOKHOR (1914) found the parasites in sores on dogs in Tashkent, while PEDROSA (1913) recorded the discovery of leishmania in an ulcer on the nose of a dog in an endemic centre of the human disease in Brazil, the only instance of a natural infection in South America.

Clinical.—Of the few clinical records worthy of note attention may be called to the cases of involvement of the mucosae of the nose and mouth recorded by CASTELLANI (1913) in Ceylon, and by CHRISTOPHERSON (1914, 1917) and SUSU (1917) in the Sudan. In CASTELLANI's case it appears that the disease commenced as an ulceration of the soft palate without any primary skin lesion. It is a remarkable fact that neither oriental sore nor kala azar occur in Ceylon, so that further information about cases of this kind is desirable. The two cases described by CHRISTOPHERSON (1914) and SUSU (1917) resembled the South American form of the disease, as there was involvement of the nasal mucosae which appeared to have arisen from an extension of ulcers on the neighbouring skin. There was also injection of the gums and hard palate. From the figures produced it would appear that these conditions were actually due to leishmania, though it is remarked that the organisms were exceedingly scanty and difficult to find. It has always to be remembered that under certain conditions, yeasts may simulate leishmania very closely.[*] That the second Sudan case, first seen by SUSU and subsequently treated by CHRISTOPHERSON (1917) rapidly recovered under tartar emetic, though the disease had been in progress for four years, is a point in favour of its leishmania nature. The photographs of these two Sudan cases are strikingly reminiscent of the numerous illustrations which have appeared of the severe naso-pharyngeal type of the disease in South America

An unintentional inoculation experiment conducted on himself by BOUILLIEZ (1917) is of interest, in that it gave rise to a type of infection not observed under natural conditions. Fluid from a mouse infected with *L. tropica* was accidentally introduced into the eye. Four months later a small nodule appeared on the conjunctival surface of the lower lid. It increased in size till it reached that of an almond. Numerous leishmania were discovered in the lesion. Cure was brought about by intravenous injections of tartar emetic. It is a well-known fact that it is easy to reproduce the disease in man by inoculation of the skin with virus from an oriental sore.

The cutaneous lesions of the South American disease appear to be more chronic in character than the oriental sore of the East. In some cases there is a tendency for the lymphatic system draining the affected area to become involved. WERNER (1911) drew attention to this conditionand demonstrated leishmania in the enlarged glands. Quite recently DE AGUIAR PUPO (1921) has described a case in which swellings appeared along the course of the lymphatics of the leg. These broke down, producing ulcers in which leishmania occurred.

Diagnosis.

As regards the diagnosis of oriental sore, the discovery of the parasite is the only method which gives reliable information. The organism can be found in smears made from material obtained by scraping the granulations, after removal of the scab if such be present. Very frequently, however, the leishmania obtained in this manner are scanty in numbers and in a degenerate state owing to the adverse conditions resulting from secondary bacterial invasion and the resulting pus formation. More normal forms can be obtained, in cases which have commenced to ulcerate, by running a fine glass pipette into the base ot the ulcer through its marginal skin. Sometimes it may not be possible to find parasites even in this way. A diagnosis may occasionally be made in such cases by the culture method. This is best carried out by sterilizing the marginal skin of the ulcer with iodine and running in a fine glass pipette through a puncture made in the skin, the object being to get beneath the ulcer so as to obtain material free from bacterial contamination. With the cells in the pipette, N.N.N. medium is inoculated. In heavy infections, flagellates appear in 48 hours, but in very scanty ones three weeks may elapse before they are present in the medium in sufficient numbers to be recognized.

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[*] In this connexion it is perhaps worthy of note that HUNTEMÜLLER (1914) described a new parasite from Jericho Boil under the name of *Plasmosoma jerichoense*. The writer was able to examine preparations containing this supposed organism. It was evident that it was merely a badly fixed leishmania. Jericho Boil is now known to be oriental sore. Similarly, CHALMERS and KAMAR (1920) recorded as *Toxoplasma pyrogenes* Castellani, 1913, certain structures which were found post mortem in a case of febrile splenomegaly from the Barun district of the Sudan. This district is known to be an endemic centre of kala azar, and from information the writer has received he is in a position to state that the supposed Toxoplasma was merely a degenerate and altered leishmania.

Treatment.

As pointed out in the section on kala azar, intravenous medication with tartar emetic was first introduced by GASPAR VIANNA in the treatment of the dermal and mucosal leishmaniasis of South America. Since then it has been employed in the treatment of oriental sore in the Old World. The number of records of its use do not appear to be as great as might be expected. SCOTT (1917) was the first observer to publish an account of the treatment of oriental sore by this method. He was successful in 63 cases of Frontier Sore in India. Unfortunately, leishmania were found only in 4 of 27 cases examined microscopically. SINTON (1917) cured six diagnosed cases in a period of 8 to 37 days. CHRISTOPHERSON (1917) obtained a good result in a severe case in the Sudan; though the disease had been in progress for four years rapid recovery took place. GREIG (1917) treated 18 Mesopotamia cases, with recovery in 17, in a period varying from 16 to 52 days. BOUILLIEZ (1918) was cured of an accidental infection of the conjunctiva by intravenous tartar emetic after injections of luargol, 606, and neo-salvarsan had failed. LOW (1920) and PATRICK (1920) report the cure of single cases, while SINTON (1921) gives a further account of the treatment of six cases in Turkestan. He remarks that in this district the disease appeared to respond more readily to intravenous tartar emetic than in Mesopotamia, where he had had previous experience. The fact that oriental sore in the Old World is a comparatively benign disease which invariably cures itself usually in 6 to 18 months, and is followed by no serious consequences save the scar, is probably the reason why intravenous injections of tartar emetic have not been employed in its treatment as freely as in kala azar. Large numbers of cases of oriental sore occurred during the war amongst troops in Mesopotamia, and many medical men were reluctant to adopt the intravenous medication with tartar emetic for a disease which was accompanied by no constitutional disturbance and which was known to be self-curing. Thus ORMEROD (1920) says that intravenous tartar emetic is efficacious but appears to be a drastic line of treatment for a localized skin lesion. It also requires detention of the patient in hospital. SINTON (1917), however, writes that the danger of the intravenous tartar emetic treatment seems slight if care is taken not to push the drug to excessive limits and to see that the patient has no kidney trouble before starting a course of treatment. The scarring left after this method seems less than after any other. It gives much less trouble to both physician and patient, besides being very much quicker than the usual means.

GREIG (1917) gave an account of 76 cases which had been sent to Karachi from Mesopotamia. With a view to obtaining comparative data of different methods of treatment, the cases were divided into five groups as follows :—(1) Control cases untreated, 24 ; (2) Intravenous injections of tartar emetic, 18 ; (3) Intravenous tartar emetic together with local inunctions with tartar emetic ointment in strength increasing from 2 to 15 per cent., 14 cases ; (4) Oral administration of tartar emetic together with inunction, 17 cases ; (5) Inunction only, 3 cases. The results, which are somewhat vitiated from the fact that the majority at least had been subject to previous treatment in Mesopotamia, are set forth in the following table:—

TABLE I.

	Groups.				
	1	2	3	4	5
No. of cases	24	18	14	17	3
Average duration of disease to admission to hospital	2·5 (months)	2·6 (months)	2·8 (months)	2·3 (months)	3 (months)
No. of days cases were under observation in hospital :—					
a. Average	21·9	28·2	32·7	25·1	18·6
b. Maximum ..	54	52	59	59	17
c. Minimum ..	5	16	19	4	15
No. of cc. of 1 per cent. A.T. administered intravenously :—					
a. Average	Nil	71·5	83	Nil	Nil
b. Maximum ..	Nil	150	179	Nil	Nil
c. Minimum ..	Nil	20	22	Nil	Nil
No. of cases :—					
Healed	20	17	13	12	3
Improved	1	0	1	1	0
Not healed	3	1	0	4	0

As the untreated cases only persisted for an average of 21·9 days, it is evident that many of the cases were well on the road to recovery when they came under observation. The method of administering tartar emetic intravenously for oriental sore is the same as that employed for kala azar.

Local Treatment.—The older methods of treatment by excision and the application of escharotics, such as powdered permanganate of potash and carbon dioxide snow, have had their advocates in more recent literature. Though these methods undoubtedly suffice in many cases to bring about a rapid cure, attempts have been made to find a more specific local treatment which will be less drastic.

Treatment by Tartar Emetic Ointment.—Low (1915) successfully treated a case by the application of a 2 per cent. tartar emetic ointment. Another case was treated by Low (1920) with this ointment as well as by intravenous injections of tartar emetic. In the table given above, GREIG (1917) records the successful treatment of three cases by means of the ointment; it is admitted, however, that these cases were recovering when they arrived in hospital. In Low's first case, treatment with salicylic acid ointment and methylene blue ointment for five weeks had only made the sore worse. Tartar emetic ointment was then applied daily for a fortnight, when it was stopped and replaced by a simple dressing. A complete healing had taken place three weeks later. In the second case, tartar emetic injections were given twice a week for three weeks, but these were discontinued owing to attacks of malaria, and local treatment with ointment was commenced a week later, with the result that the sore had healed in a month.

Treatment by X-rays.—This line of treatment was adopted in Mesopotamia during the war. The best account is given by ORMEROD (1920), who found it to be the most practicable method for the following reasons :—(1) The rays act directly on the causative organism ; (2) They are able to penetrate unbroken skin or masses of diseased tissue, thereby being efficient in ulcerated and non-ulcerated sores alike ; (3) Cases can be treated as out-patients and can very often continue their occupation ; (4) There is no risk of constitutional disturbance, the danger of dermatitis or necrosis being absent with the doses used ; (5) The treatment is short, painless, and easy to administer ; (6) Sores in awkward positions such as the inner canthus of the eye, lips and alae nasi can very readily be dealt with ; (7) The scars left after healing are supple and of such a colour in about six months as to be barely noticeable. Of 84 cases, showing in all 136 sores, the average time from the commencement to complete healing of the sores was 27 days, with a minimum of 10 days and a maximum of two months. The description of the technique is given in full in this *Bulletin*, Vol. 17, p. 364. MITCHELL (1921) states that at a Basra hospital after a trial of every possible method of treatment it was found that a single full pastille dose of X-rays produced a cure in 10 days in the majority of cases. TRESTON (1921) also reports good results from X-ray treatment.

Treatment by Ionization.—EVANS (1918) found this method to give most satisfactory results. The ulcer is cleared of all septic material and crusts and is covered with a pad extending for half an inch beyond the edge of the sore. The pad consists of 16 layers of lint soaked in 2 per cent. zinc sulphate solution and is firmly applied to the ulcer under a zinc electrode by means of a bandage. The pad is connected with the positive pole of the current. The indifferent pad, which must be of much larger size, is placed on any convenient part of the body. An arm or a leg bath with saline solution may replace the indifferent pad. The current is supplied by 18 accumulators, giving an average of 36–38 volts. This is connected with a short resistance so that the current can be gradually increased. A patient with a sore having an area of about one square inch is usually able to stand 10 milli-ampères. The application is continued for 20 minutes, during which the pad is constantly moistened with zinc sulphate solution. Of eight cases cured at the time of writing, the number of applications and the number of days required for the sore to heal were 5–30, 4–22, 5–36, 2–6, 5–8, 3–8, 2–7 and 6–12 respectively. MACCORMAC (1919) treating a case by ionization with sodium hypochlorite obtained rapid healing.

Treatment by Injection of Emetine.—PHOTINOS (1920) described a new method of treatment for oriental sore in Crete, which he had found efficacious in 23 cases. He injected a solution of emetine hydrochloride around and below the sore, both subcutaneously and intracutaneously. For a small sore the total amount of the drug necessary was 0·01 gm., while for large sores he used 0·05 gm. The injections are made with a fine needle and the solution is forced into the skin at various points in the whole area around the sore. In sores which require the above doses only one sitting is necessary, complete healing taking place after the lapse of 15 to 30 days. In larger sores or multiple lesions it is necessary to inject the requisite quantity of drug at intervals of a few days. CALICETI (1920) treated two cases of Sicilian origin by this method. Two injections were given of 8–10 cgm. of emetine hydrochloride and cure was complete in three weeks.

Other Methods of Treatment.—GRAY (1921) reports that during 1917 and 1918, in Mesopotamia, he treated over 200 cases of oriental sore by scraping and cauterizing with carbolic acid. The average length of time required to bring about a cure was 17 days, and it was his experience that relapse was uncommon and the scars less obvious than after other methods of treatment.

DUCKWORTH (1921) states that he found the following method very efficacious in Mesopotamia. After cleaning the sore a piece of lint the exact size of the ulcer was soaked in a solution of urotropin (1 drachm to the ounce) and applied to the sore. The applications, which are made twice daily, are accompanied by continued healing of the sore. TRESTON (1921), from experience gained in Mesopotamia, advocates the following lines of treatment :—(*a*) For sores in the early stages, X-ray applications and crystals of potassium permanganate ; (*b*) For fairly advanced cases, crystals of potassium permanganate and intravenous tartar emetic ; (*c*) For sores in the advanced stages, thorough scraping under chloroform and application of ol. ricini dressings ; (*d*) For sores on the face, other than those in very early stages, intravenous tartar emetic.

For treatment of the more serious type of the disease met with in South and Central America, GASPAR VIANNA's treatment by intravenous injections of tartar emetic is still mostly employed. There have been many reports of the good results following its use. It is admitted that the drug acts more readily on the purely cutaneous condition, though frequently remarkable recoveries occur in the more serious naso-pharyngeal cases with long histories extending over many years. TORRES (1920) describes the method of treatment in detail. It consists in the injection of 0·06 to 0·07 of a gm. as an initial dose, increasing at each injection by 0·02 gm. up to a dose of 0·12 to 0·14 gm. After fifteen of these injections, a week's rest from treatment may be necessary. At the same time the local skin and pharyngeal or nasal lesions are treated with a 0·1 per cent. solution of tartar emetic. Some cases, however, do not respond to this treatment, in which case "protosan," a preparation made by the Instituto Oswaldo Cruz, has been used with advantage. He describes one case which had 248 separate lesions on different parts of the body. Treatment with tartar emetic and protosan was being carried out with definitely good results when the patient contracted a fatal pneumonia. TEJERA (1920) records the case of an Englishman who had a sore on the ear : 50 injections of 10 cgm. of tartar emetic were given without any but a temporary improvement. ESCOMEL (1917) states that he has successfully treated several cases as out-patients with Martindale's oxide of antimony solution. An injection of 6–8 cc. can be given each week or 1–2 cc. every two days. The drug keeps well and can be given subcutaneously, intramuscularly or intravenously.

It is evident that for some reason not properly understood tartar emetic occasionally fails to effect a cure in the South American disease. This is also true to some extent of the more benign oriental sore of the Old World.

Animal Experiments.

NICOLLE and SICRE (1908) first showed that inoculation of the skin of monkeys either with virus from a human sore or with culture of *Leishmania tropica* was followed by the development of a sore in which leishmania could be demonstrated. NICOLLE and MANCEAUX (1910) proved that dogs were similarly susceptible. Since then, many animals have been successfully inoculated by LAVERAN and others; the outcome of these experiments clearly demonstrates that oriental sore of both the Old and New World can be readily produced in dogs and monkeys, and with less certainty in other animals. GONDER (1913) was the first to show that a general infection in mice could be produced by intraperitoneal or intravenous injection of culture of *L. tropica.* In the infected animals there was great enlargement of the liver and spleen, while there developed on the legs, tail and head, oedematous swellings which finally ulcerated. In all these lesions, leishmania was found. GONDER noted that in infections produced with the virus of infantile kala azar, no skin lesions resulted. It was possible to hand on the infections from mouse to mouse by subinoculation. Extensive experiments with mice were conducted by LAVERAN from 1914 onwards. He was able to confirm GONDER's results as regards the production of a general infection and the skin lesions, and further demonstrated that some of the mice acquired a heavy infection of the tunica vaginalis which caused such a thickening of this structure as to give rise to visible tumours. The infection was inoculable from animal to animal, but it was only in certain mice that the heavy infections occurred. In severe infections there was swelling and ulceration of the legs, feet and head, while the lesions sometimes revealed leishmania in enormous numbers. Recovery from the milder infections was the rule, and, as had been previously shown by NICOLLE in the case of monkeys and dogs, the recovered animals were susceptible to reinoculation. Many observers have failed to infect mice, so that it appears that it is only occasionally that a strain is obtained which is pathogenic to these animals. LAVERAN was also successful in infecting guinea-pigs, rats and gerbils.

An exhaustive account of experimental inoculation of both *Leishmania tropica* and *Leishmania donovani* is to be found in LAVERAN's treatise on Leishmaniasis published in 1917.

Transmission.

Oriental Sore in the Old World.—Of the many theories as to the mode of transmission of oriental sore which have been propounded, that which is received with most favour at the present time attributes it to the bite of the sand fly, a view which was first suggested by PRESSAT in 1905. In the same year the brothers SERGENT attempted to produce an infection by the bites of this insect at Biskra. In 1911 the writer suggested the sand fly as a possible vector in Baghdad. In 1915, SERGENT (Ed. & Et.), LEMAIRE and SÉNEVET attempted to produce infection in man, monkey and mouse by the bites of *Phlebotomus minutus,* and also by inoculation of the skin with crushed flies; the results were negative. ACTON (1919) drew attention to the fact that the sites of Phlebotomus bites on the body corresponded with those of oriental sore as it occurred in Mesopotamia, and that the bites of other insects did not thus correspond. In 1911 the writer discovered that 6 per cent. of Phlebotomus in

Aleppo harboured a flagellate of the leptomonas type, an observation which was confirmed by MACKIE (1914) in *Phlebotomus minutus* in India, and by LAVERAN and FRANCHINI (1920) in *P. papatasii* in France. PATTON (1919) stated that both *P. minutus* and *P. papatasii* were known to harbour the flagellate in Mesopotamia, yet in 1922 he writes that *P. papatasii* is infected in Palestine and *probably* in Mesopotamia. Cultures of the flagellates were obtained by LAVERAN and FRANCHINI in N.N.N. medium and with them they claim to have produced a general infection in mice and guinea-pigs, and on the skin of dogs local lesions resembling oriental sore. The incrimination of the sand fly has been taken a stage further by the brothers SERGENT, PARROT, DONATIEN and BÉGUET (1921), who describe the production of an oriental sore on the arm of a human being in Algiers two and a half months after a scarified area of the skin of the arm had been treated with saline solution in which had been crushed seven *Phlebotomus papatasii*, collected at Biskra three to four days before. On August 16 and 17, 1921, a batch of 94 sand flies was collected at the military hospital of Biskra, a well-known endemic centre of oriental sore. They were despatched to Algiers, where the disease is not known, a distance of 600 kilometres. Only seven *P. papatasii* arrived alive. These were broken up in saline solution and the fluid applied to a scarification in the upper third of the forearm of a human being. The wound healed without leaving any trace. Two months and twenty-four days after the experiment a small papule with central incrustation was noted at this spot. It was examined the next day and was found to contain numerous leishmania as in oriental sore. It is interesting to note that in the fluid applied to the sore no flagellates nor other organisms were visible.

This experiment demonstrates that the *P. papatasii* can harbour for at least three days a virus which is able to produce a lesion resembling oriental sore in its characters, in the parasites it contains, and in the length of the incubation period required for its development.

As the observers remark, it is only by further work that it will be possible to determine the origin of the virus in the fly, whether derived from a reservoir or a flagellate infection natural to these flies, and the exact mechanism of infection in nature.

Another aspect of the sand fly problem is the view first enunciated by SERGENT, LEMAIRE and SÉNEVET (1914), that the gecko (*Tarentola mauritanica*) may act as a reservoir for the virus of oriental sore. In support of this view they note that the lizard is ravenously fed upon by sand flies, and, furthermore, that a flagellate of the leptomonas type was culturable from the organs of 15·7 per cent. of the geckos. LAVERAN (1915) attempted without success to infect geckos with *Leishmania tropica*. The presence of the flagellate in geckos was again noted by CHATTON and BLANC (1918), who, moreover, obtained a temporary development in bed bugs fed on geckos, an observation which may throw some light on the behaviour of leishmania in these insects. Later in the same year these observers found that the geckos of Tunis were free from the flagellate found in the animals further south. They accordingly inoculated geckos intraperitoneally with cultures of *Leishmania tropica*. In one experiment three cultures from the blood were positive in three of twelve geckos which had been inoculated one, twelve and thirteen days before. In another experiment in which the geckos were left at a temperature of 22° and 23° C., three out of four were positive on the twelfth day. NICOLLE, BLANC and LANGERON (1920) repeated these experiments and found that the flagellates occurring in cultures of the natural gecko flagellate were morphologically distinguishable from those in cultures of *Leishmania tropica*. The blood of a naturally infected gecko was inoculated intradermically to a man on two occasions and also to a monkey, while three men and a monkey were inoculated with cultures of the flagellate. No infection occurred in any case. They also failed to produce an infection in uninfected geckos by inoculating the blood of infected geckos and cultures of the flagellate. They conclude that the flagellate is only accidentally present in the blood of geckos and that it is probably of intestinal origin. LAVERAN and FRANCHINI (1921) found that the blood of geckos of Italy also harboured this flagellate, while FRANCHINI (1921) discovered that a flagellate of the leptomonas type also occurred in the rectum, thus upholding the view of NICOLLE, BLANC and LANGERON, that the blood flagellate was the result of accidental invasion of an intestinal form. On the whole there seems to be little real evidence that the gecko plays the part of reservoir for the virus of oriental sore.

PARROT (1919) records an observation which is of interest in the light of the gecko experiments just described. Eight female sand flies and six geckos were brought in a cage from a place where oriental sore is endemic to another where the disease does not occur. The flies escaped and three months later three individuals in the house developed oriental sore. One of these was the medical man who had collected the flies and had been exposed to infection elsewhere, but the other two had not been in an endemic zone for one, and three and a half years respectively. Even supposing the disease was caused by the escaped flies, there is no proof that they were not already infected when caught.

Bed Bug.—PATTON, who was the first to suggest the bed bug as a vector for oriental sore in Cambay in India, still maintains that this is the carrier so far as Cambay is concerned, though he believes (PATTON, 1919) that in Mesopotamia the sand fly is to blame. His reasons, which have been restated in a recent paper (1922), for suspecting the bed bug are that he considers the parts of the body most usually bitten by bugs are those in which oriental sore most commonly occurs, that the parasite *Leishmania tropica* becomes a flagellate in the stomach of the bug, as was first demonstrated by the writer (1911), and that he has been able to discover development in the stomach cells of bed bugs like that described by Mrs. ADIE (1921) for *Leishmania donovani*. It does not appear, however, that this development was seen in living bugs. CORNWALL and LA FRENAIS (1922) conducted experiments with both *L. tropica* and *L. donovani* with a view to obtaining evidence of an intracellular stage. The bugs were fed on cultures and at varying times after feeding the gut was removed, fixed and sectioned. By this technique the exact relation of parasite to cells is maintained. Though heavy flagellate infections of the lumen of the gut were found, there was no evidence of any intracellular stage, an observation which is in support of the view expressed in Part 1 of this Review (p. 15) that the intracellular stages observed by Mrs. ADIE and by PATTON possibly represented merely a culture in dead or dying cells. CORNWALL and LA FRENAIS also state that the thick-tailed form of the parasite in the bug, first seen by CORNWALL, is a form which has no place in the true cycle of development of the flagellate. There seems to be even less evidence in favour of regarding the bed bug as a carrier of oriental sore than of kala azar. Mrs. ADIE (1922) telegraphs that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of a bed bug taken from the bed of a suspected case of kala azar.* This discovery possibly provides further ground for suspecting the bed bug, but cannot, as she claims, supply the positive proof that kala azar is transmitted by the bite of the bug. There was no evidence that this particular bug had fed upon a kala azar case, nor that the flagellate observed was actually the kala azar parasite, which cannot be distinguished on morphological grounds from many purely insect flagellates occurring not only in the intestine but also in the body cavity, salivary glands and other organs of insects.

House Fly.—BLANC and CAMINOPETROS (1921) conducted an inquiry into the distribution of oriental sore in the Island of Crete. No evidence of any vertebrate reservoir of the disease could be obtained and they concluded that man is the only host, and that the disease is handed on from one to another by direct contact. Flies were allowed to feed on sores and five hours later the legs and heads were crushed in a drop of liquid from N.N.N. medium, which was then inoculated into the skin of the arm. No sores had developed after four months' observations. It is concluded that flies play no part in the carriage of the infection. These observers, however, have overlooked the possibility that flies may take up leishmania from a sore and pass them in their faeces on to an abrasion of the skin of another person within five minutes, as was shown by WENYON and O'CONNOR (1917) to occur in the case of Trichomonas.

Leishmaniasis of South America.—Direct observations on the means of transmission of the leishmaniasis of South America are few and far between, though there has been much speculation as to the possible vector. Biting flies, such as Tabanidae and Simulidae, as also ticks, have been suspected, but there is no experimental evidence to support these theories. TOWNSEND (1915), conducting investigations in Peru, suspected Chironomidae of the genus *Forcipomyia* as transmitting the disease. He found leishmania forms of a flagellate in the intestine of the flies, and by inoculating a guinea-pig in the skin with crushed flies, produced a papule in which he stated scanty leishmania forms occurred.

Now that Phlebotomus is generally regarded as the vector of oriental sore in the Old World, an American species, *P. lutzi*, is being suspected as playing a rôle in the spread of the American disease. So far there is no experimental evidence of this, but CERQUEIRA (1920) relates the experience of a professor of Bahia who developed a typical sore at the site of the puncture made by one of these flies. He states that four instances of a similar kind have come to light.

On the question of the relationship of the insect flagellates to *Leishmania tropica* and the culture of the flagellate, there is nothing to add to the remarks which were made in Part I of this review, save that the instance of the viability of the parasite in the cadaver referred to in connexion with the culture of *L. donovani* was an observation of PEDROSA (1917) of the successful culture of leishmania from a cutaneous ulcer in South America, 36 hours after death.

Prophylaxis.

Sterilization of all insect bites with iodine solution has been advocated as a means of avoiding infection, while on the assumption that the sand fly is the vector, protection from the ravages of these insects by means of sand fly nets (22 holes to the linear inch) is the natural procedure to adopt.

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* From reliable information which the writer has received from India it appears that the structures observed by Mrs. ADIE were neither Leishman-Donovan bodies nor stages of any other flagellate, but some totally distinct organism.

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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

HELMINTHIASIS.

FISCHER (Walther). **Ueber Darmparasiten bei Gesunden und Kranken in Shanghai.** [Intestinal Parasites of Healthy and Sick in Shanghai.]—*Cent. f. Bakt.* 1. Abt. Orig. 1920. Feb. 11. Vol. 84. No. 2. pp. 135–142.

From an examination of the faeces of (1) 300 Europeans and half-castes, nearly all of whom were suffering from intestinal complaints; (2) 108 German soldiers belonging to the sanitary corps, all in good health; (3) 200 Chinese, some well, some ill, the author obtained the following percentages of infection:—

(1) With ascaris, 6 per cent. of the Europeans and half-castes, 10 per cent of the soldiers and 25·5 per cent. of the Chinese. (2) With trichocephalus, 23 per cent. of the Europeans and half-castes, 6 per cent. of the soldiers, 30 per cent. of the Chinese. (3) In oxyuris an examination of faeces does not show the number of infected persons. Oxyuriasis is, however, rare in China, both in Europeans and Chinese. (4) With ankylostoma, 1·3 per cent. of the Europeans and half-castes, 4 per cent. of the Chinese and no soldiers. Infection is rare in Shanghai, though frequent in other districts. (5) With strongyloides 1 per cent. Chinese, none in Europeans. In South China and sometimes in Indo-China infection is much more frequent. (6) Tapeworms were almost unknown. (7) With *Clonorchis sinensis*, 6 out of the 300, *i.e.*, 2 per cent., all of whom were half-castes, no soldiers and 7 per cent. Chinese: infection is due to eating raw fish. (8) Two cases of infection with *Fasciolopsis buski* were found in the Chinese. No case of *Fasciola hepatica* was observed. The rest of the article deals with the protozoa met with.

R. T. Leiper.

MOTAIS (François). **Du parasitisme intestinal en Annam.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 596–603.

During 1917, 3,010 stools from soldiers recruited from seven provinces of central Annam were examined. The following record of infection was made:—*Ascaris lumbricoides*, 72·05 per cent.; *Necator americanus*, 56·84 per cent.; *Trichocephalus trichiuris*, 9·89 per cent.; *Clonorchis sinensis*, 0·23 per cent.; Ascaris plus Necator, 39 per cent.; Ascaris plus Trichocephalus, 7·27 per cent.; Necator plus Trichocephalus, 4·81 per cent.; Ascaris plus Necator plus Trichocephalus, 3·12 per cent. *Oxyuris vermicularis* was observed 27 times. *Taenia saginata* was very common, *T. solium* much less frequent, while *Hymenolepis* was found once. *Sparganum mansoni* occurred frequently in periocular troubles. One stool containing eggs of Necator yielded an interesting culture; from 2nd to 5th day, rhabditiform larvae; from 5th to 20th day, strongyloid larvae; from 20th to 28th day, negative result; on 28th day, numerous rhabditiform larvae reappeared and persisted until the 70th day; from 30th to 64th day, larval females, corresponding to *Strongyloides stercoralis* were numerous. Flagellates were especially common from April to September.

R. T. L.

KOJIMA (Taiji) & GEI (Kôkai). **[Results of Examinations of Intestinal Parasites of the Students of the Formosa Medical College.]**—*Taiwan Igakkai Zasshi* (*Jl. of the Formosa Med. Soc.*). 1920. Feb. 8. Nos. 206–7. pp. 117–20.

The paper consists of three tables, the first of which is here reproduced. In the second table the figures are classified according to the year classes, and in the third the students are treated according to their native districts.

	Aborigines, including Chinese.	Japanese.
Number of students examined	268	30
Age	14–27	18–30
Number of cases where worm eggs were found	207 (77·2%)	16 (53·3%)
Ancylostoma duodenale	46 (17·2%)	—
Ascaris lumbricoides	123 (45·8%)	15 (50·0%)
Trichocephalus trichiuris	148 (55·2%)	14 (46·6%)
Oxyuris vermicularis	1	—
Taenia solium	1	—
Ancylostoma duodenale + *Ascaris lumbricoides*	12 (4·5%)	—
Ascaris lumbricoides + *Trichocephalus trichiuris*	69 (25·7%)	4 (13·3%)
Ancylostoma duodenale + *Ascaris lumbricoides* + *Trichocephalus trichiuris* ..	21 (7·8%)	—

Hiroshi Ohshima.

LAMBERT (S. M.). **Intestinal Parasites in North Queensland.**—*Med. Jl. Australia.* 1921. Apr. 23. 8th year. Vol. 1. No. 17. pp. 332–335. With 1 map in text.

As a result of the hookworm investigations during 1918–1920 an idea may be obtained of the prevalence of the more common intestinal parasites in the coastal belt of North Queensland. The figures given are based on the examination of approximately 95 per cent. of the population of the coastal belt from Proserpine to Cooktown—except in Ayr, where the work was not completed, and in Townsville and Charters Towers, where only schoolchildren were examined. The examinations were made primarily for hookworm infection, so that the figures of prevalence of other parasites are lower than their actual incidence.

Persons examined ..	29,745
Total infections	5,601 (18·83 per cent.)
Infection with Hookworms (*A. duodenale* and *N. americanus*)..	4,910 (16·51 ,,)
Ascaris lumbricoides ..	31 (0·10 ,,)
Trichuris trichiura ..	336 (1·13 ,,)
Strongyloides stercoralis..	106 (0·36 ,,)
Oxyuris vermicularis ..	126 (0·43 ,,)
Hymenolepis nana ..	87 (0·29 ,,)
Other tapeworms ..	5 (0·02 ,,)

Tables are also given showing the geographical distribution of these intestinal worms in the various regions of North Queensland. In all the cane-growing districts, except the Ayr district—which is in a belt of low rainfall—there is a heavy infection rate for hookworm. In the districts having a rainfall of over 90 inches the average hookworm infection is 24·9 per cent. In those below 50 inches the average is 2·5 per cent.

There is an unusually high proportion of the infections in childhood—especially in the age group 8 to 12; it is attributable partly to the fact that the children are barefooted and partly to the recent spread of the infection. The present generation of adults was probably not so highly infected in childhood as are the children of to-day.

R. T. L.

DA MATTA (Alfredo). **Nota sobre a fauna helminthologica na populaçâo infantil do Amazonas.**—*Brazil-Medico.* 1921. Oct. 1. Year 35. Vol. 2. No. 12. pp. 167–169.

Of 1,850 children whose faeces were examined by the author during a period of 12 years, 1,620 were found either to be suffering from verminoses or to be carriers of worms, the numbers being 748 or 46·27 per cent. in the former case and 872 or 53·83 per cent. in the latter. The author emphasizes the magnitude of the danger to the general well-being represented by this widespread infestation of the children of Amazonas with intestinal parasites, and urges that the evil be attacked with vigour. The four parasites most frequently found by the author were, in order of frequency, necator 1,270, trichocephalus 896, ascaris 822, oxyuris 340.

F. S. Arnold.

LEGER (Marcel). **Parasitisme intestinal chez les enfants à la Guyane française : sa relation avec la pureté des eaux de boisson.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 85–89.

The thesis propounded by SOULIÉ and DERRIEU that it is possible to estimate the purity of drinking waters by ascertaining the parasitological index of the population is shown by the author to be fallacious. 242 native soldiers of French Guiana were found to be carriers of parasites to the extent of 82·7 per cent. Of 92 children between 1 and 12 years old in the city of Cayenne 70 per cent. were infested. Nevertheless typhoid and paratyphoid are very infrequent and the water is one of great purity.

R. T. L.

HODSON (V. S.). **Intestinal Worms.**—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. p. 244.

The result of a heavy hookworm infection in inhibiting development has to be seen to be believed. Worm infections generally have ill effects in handicapping growth and development. Of 57 boys admitted to the Gordon College for various causes, 13 had *Taenia nana*, 1 *Taenia saginata*, 7 ankylostomiasis, 11 ascaris, 6 oxyuris, and 10 *Bilharzia mansoni*. Clinical notes are given of a woman aged 35, admitted to hospital with a history of abdominal pain for two months with great increase in three days. The abdomen was rigid and there was all the appearance of general peritonitis. On opening the abdomen a large collection of pus was found among the intestines, which were matted together. A drainage tube was inserted and in the particularly evil-smelling pus discharged two segments of *T. saginata* were found later. A large mass of this tapeworm was passed per rectum after treatment with male fern. The wound healed.

R. T. L.

VON GOTTBERG (J.). **Studien ueber die Zunahme der Häufigkeit von Darmparasiten bei Kindern im Kriege. Ein Beitrag zu ihrer Diagnostik und Therapie.** [Increase of Frequency of Intestinal Parasites of Children in the War. Their Diagnosis and Treatment.]—*Arch. f. Kinderheilkunde.* Stuttgart. 1921. Apr. 16. Vol. 69. No. 3–4. pp. 161–184.

Of 200 children in Bonne examined in the summer of 1919 at the Medical Poliklinik, 125, *i.e.*, 62·5 per cent. were found to have worms. Compared with earlier statistics there has been an increase in helminthiasis of late years. The number of ascaris and oxyuris hosts is especially high among town children, whereas an increase is not noticeable among country children.

R. T. L.

FÜLLEBORN (Friedrich). **Die Anreicherungen der Helmintheneier mit Kochsalzlösung.** [Concentration of Helminth Eggs by Salt Solution.]—*Deut. Med. Woch.* 1920. June 24. Vol. 46. No. 26. pp. 714–715. With 1 text fig.

The following is a new modification of KOFOID and BARBER'S method for the examination of faeces for ova of helminths.—In a glass of about 200 cc. capacity is placed a mixture of 1 part of faeces (normal consistency) to 20 parts of concentrated salt solution. The whole is made into a thinnish mixture of even consistency. The glass should be filled about 7–8 cm. high. In this mixture the eggs rise rapidly to the surface, where the greatest number are to be found in from half to three-quarters of an hour. After several hours they disappear from the surface. Not only ancylostoma, necator and trichostrongylus eggs but also ascaris eggs can be examined by this method. Ascaris eggs rise more slowly to the surface than ankylostome eggs, so that even after one hour or more an examination may give negative results.

The method is excellent for the eggs of *Hymenolepis nana*, whereas eggs of *Hymenolepis diminuta* sink again after three-quarters of an hour. *Taenia saginata* and oxyuris eggs can also be searched for by this method, although Telemann's method may prove better. The method is not applicable to bothriocephalus or trematode eggs, nor to strongyloid larva. The author did not find it successful for amoeba or lamblia cysts but it proved very satisfactory for coccidia cysts.

R. T. L.

BASS (C. C.). **Diagnosis of the Commoner Intestinal Parasitic Infections.**—*Southern Med. Jl.* 1921. Nov. Vol. 14. No. 11. pp. 863–865.

For the examination of faeces a specimen can be taken either from the stool or from the rectum direct by means of a glass tube. The most satisfactory specimens for oxyuris are made by scraping the folds of the anus and vulva with a microscope slide or a glass rod. At least one preparation should be examined made by dissolving a particle of the faeces in water; if this is neglected strongyloides larvae and other valuable information may be missed. Finally a specimen should be prepared for the concentration of ova. The brine flotation method had been improved, but though the writer was its originator he now thinks the centrifuge method without brine is more suitable. The tube containing the diluted and strained faeces should be centrifuged just long enough to throw ova to the bottom and not longer. The time for any particular centrifuge should be determined by trial.

R. T. L.

DA SILVA (Pedro Dias). **Novo signal de verminose.** [A New Sign of Helminthiasis.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. May. Vol. 4. Ser. 2. No. 3. p. 60.

The author finds that in cases of verminous infection, especially with ascarids, and to a less extent with oxyuris, trichocephalus and taenia, the fungiform papillae of the tongue are red and prominent, especially at the edges and point of the organ, the condition disappearing with the expulsion of the worms. In ankylostome infection the tongue is large, pale, and indented, except when other helminths are present, when the fungiform papillae are prominent. He believes the sign to be of value in diagnosis especially in ascariasis.

A. G. B.

CORT (William W.). **Prenatal Infestation with Parasitic Worms.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 15. Vol. 76. No. 3. pp. 170–171.

There are few records of prenatal infestation with parasitic worms and these the author has briefly summarized. FUJINAMI and NAKAMURA have reported *S. japonicum* from a foetus of a bitch which was suffering from schistosomiasis and NARABAYASHI caused the foetuses of pregnant bitches to become infected experimentally. The eggs of *S. japonicum* were found in the faeces of three out of 22 newborn babies in an endemic area. HOWARD reports an undoubted case of prenatal infestation with hookworm in a negro child in British Guiana: eggs were found in the child's faeces 14 days after birth. Other possibilities of future discoveries are discussed.

R. T. L.

CHASSOT. **Vers et appendicite.**—*Rev. Méd. Suisse Romande.* 1920. July. Vol. 40. No. 7. pp. 449–453.

The author was called to see a patient with all the symptoms of a typical appendicitis. On opening the peritoneal cavity the appendix was seen to be normal, except for intense hyperaemia of its serous coat. The appendicectomy was successful and the cure complete. The appendix was found to contain faecal matter and nine oxyuris but without signs of appendicitis. This case led the author to consider from the statistics on the subject, the question of distinguishing between a true appendicitis and an appendix invaded by worms. Of 100 normal appendices taken from dead bodies the author found that 10 contained parasites or their eggs, and of 100 removed by operation he found 41 containing parasites or eggs; but out of these 41 there were only six that showed obvious pathological changes. The others were therefore not acute cases; on the contrary when acute inflammation existed parasites were rarely, if ever, found. The author therefore concludes that parasites do not cause appendicitis, but produce a condition simulating inflammation.

M. RIFF has arrived at the opposite conclusion. In 152 extirpated appendices he found 30 per cent. contained oxyuris, and in appendices extirpated from children under 15 years he found oxyuris in 75 per cent. of cases; he concludes that oxyuris are the first cause of appendicitis in the majority of cases; in addition 75 per cent. of autopsies made in Europe show the remains of former lesions of appendicitis. As there is no sure method of getting rid of oxyuris he concludes that it is better to operate than to wait, thus relieving or obviating an appendicitis, and depriving the oxyuris of a nest in the appendix. The author concludes that until more information is available it is better not to operate unless the symptoms are severe.

R. T. L.

LÉO (G.). **Helminthiase et dysménorrhée douloureuse.**—*Bull. Acad. Méd.* 1921. Mar. 8. Vol. 85. No. 10. pp. 319–321.

Helminth infections and particularly those due to oxyuris and ascaris can induce painful dysmenorrhoea. COUILLAUD'S sign is a very reliable indication of helminth infection. This consists of hypertrophy of the fungiform papillae of the tongue, which are visible to the naked eye as small red points at the tip and along the margin. A female patient with COUILLAUD'S sign associated with painful dysmenorrhoea should be treated with a vermifuge.

R. T. L.

FAIRLEY (N. Hamilton). **Observations and Reflections on the Toxicity, the Immunity Response and the Treatment of Certain Helminthic Infestations.**—*Med. Jl. Australia.* 1921. Mar. 12. 8th year. Vol. 1. No. 11. pp. 205–211.

After summarizing the causes underlying the pathogenicity of Helminths, the author reviews briefly the serological reactions, of which the precipitin test has limited application to taenia infestations. The complement-fixation reaction depends for success on the production of a suitable antigen. In hydatid the pure unadulterated fluid from the cysts constitutes the best antigen and its antigenetic property is largely dependent upon the scolex content of the cyst. Alcoholic extracts are inferior and give pseudopositive reactions with syphilitic sera. In hydatid disease in man an immune body may be detected in the blood serum and in peritoneal or pleural exudates. The cerebro-spinal fluid is negative unless the cyst is situated within the pia-arachnoid. From the surgical point of view this reaction is of the greatest importance as a means of determining whether a patient is rid of all cysts or not. The test as applied to bilharziasis has been used by the author latterly to control the effects of tartar emetic in treatment. In 39 out of 54 cases of less than two years' duration the reaction was positive, so in 31 out of 46 cases of more than two years' duration. Where an alcoholic extract was used 88 per cent. of 36 bilharzia cases of under two years and 74·2 per cent. of 97 chronic cases were positive. In discussing anaphylaxis the author states that there can be little doubt that the phenomena resulting from the rupture of a hydatid cyst or its leakage after puncture are anaphylactic in nature.

R. T. L.

ROUILLARD (J.). **Les toxines vermineuses.**—*Presse Méd.* 1921. Apr. 9. No. 29. pp. 285-287.

This is a summary of recent work on the effects of helminth parasites. From a consideration of the arguments in favour of their toxic origin the author concludes that the products of the excretions or secretions of the parasite, like the aqueous or alcoholic extracts, act on the animal organisms like foreign proteins. There is protein shock with the primary injection and tachyphylaxis as in the case of peptones or organic extracts. Moreover one must admit the toxic character of these albuminoid substances, for they have the property of inducing special anaemias, cachexias, and eosinophilia and their injection results in circulatory and respiratory disturbances and a highly characteristic diarrhoea.

R. T. L.

JOURNAL OF PARASITOLOGY. 1921. June. Vol. 7. No. 4. pp. 186-201. With 3 text figs. **Proceedings of the Helminthological Society of Washington. (45th to 50th Meeting).** [HALL (Maurice C.) Secretary.]

Dr. CORT states that a new species of fluke parasitic in man was described in Japanese literature by ONJI and NISHIO, 1915, under the name of *Heterophyes nocens*. This fluke was stated to occur in two villages and to infest from 22 to 30 per cent. of their inhabitants. The final larval stage occurs in a fish, *Mugil japonicus*, which is customarily eaten raw. The parasite is very similar to *Heterophyes heterophyes* but is smaller, measuring 0·9 to 1·1 mm. in length. There are about 60 rodlets around the genital sucker. The encysted larvae when fed to dogs become mature and produce eggs in 7 to 8 days.

Dr. BARTSCH states that the correct name of the carrier of *Schistosomum japonicum* is *Blandfordia japonica* (Adams, 1861). Dr. CORT drew attention to TANABE's report of *Echinostoma perfoliatum* var. *japonicum* from man.

A third case of *Gongylonema hominis*, species inquierenda, was reported by STILES.

R. T. L.

GIRARD. **La bilharziose américaine à Madagascar.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 62-75.

Vesical bilharziasis would appear to be absent from Madagascar, but the author has seen, since 1916, 26 cases of intestinal bilharziasis due to *S. mansoni*. The intestinal infections fall into several clinical types; the most common is a dysenteric diarrhoea similar to amoebic dysentery, developing no fever and accompanied at times by intestinal haemorrhage. In other cases the occurrence of traces of mucus or of blood in the stool leads to a microscopical examination, or there may be hepatic cirrhosis, the bilharzial nature of which is also revealed by an examination of the stool. The eggs are infrequent and it is often necessary to examine several preparations at intervals for several days to find them. The author administers methylene blue in doses of 30 cgm. daily, in three cachets, for ten days. After an interval of five days the treatment is resumed and maintained until the eggs disappear from the stool. The author also recommends a trial of tartar emetic.

R. T. L.

LEGER (Marcel) & PRINGAULT (Ernest). **Helminthiase intestinale et bilharziose à** *Schistosomum mansoni* **à Madagascar.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 247–253.

The authors have taken advantage of an opportunity afforded them of examining at Marseilles the stools of 150 soldiers belonging to a battalion of "Tirailleurs malgaches" from various provinces of Madagascar. They were young and recently recruited; 76 per cent. were infested with intestinal entozoa, 56 per cent. with ascaris, 33·33 per cent. with hookworm and 30 per cent. with whip-worm. Neither eggs of oxyuris nor embryos of strongyloides were seen. Both the Necator and Ancylostoma species were present but *Necator americanus* was the more frequent. Fourteen out of the 150 soldiers were carriers of *S. mansoni*. The authors conclude with a discussion of the risks of introduction of *S. mansoni* and *Necator americanus* into France.

R. T. L.

MORIN (G. H.). **Sur la présence d'oeufs de** *Schistosomum mansoni* **à Madagascar, dans les selles d'individus sains cliniquement.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 229–231. (Discussion p. 231).

A study of fresh dejecta from 394 healthy persons on the south-east coast of Madagascar (Farafangana) showed that all but three, *i.e.*, 99·24 per cent., were infested with entozoa. Ascaris occurred in 71 per cent., trichocephalus in 65 per cent., ankylostomes in 32 per cent., bilharzia in 12·9 per cent., larvae of strongyloides frequently and in one case *Taenia saginata*. All the specimens of hookworm were *A. duodenale*. Necator was absent. The eggs of bilharzia belonged to *S. mansoni*. The endemic area of bilharzia infection is limited to the low country but is widely diffused along the eastern coast of Madagascar.

R. T. L.

RISQUEZ (J. R.). **Note sur la distomatose et la bilharziose humaines au Venezuela.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 382–385.

A species of Fasciola has been recorded in man in Venezuela about a dozen times, identified from the eggs found in the stools as *F. hepatica*. Cases of Bilharzia have been frequently met with; the parasite is *Schistosoma mansoni*, whose intermediate host is *Planorbis guadalupensis*. Examination of a large number of cases has shown the general occurrence of enlargement of the liver, ulceration of the rectum, eggs in the appendix, lungs, lymphatic glands, especially the mesenteric glands. At Caracas, the co-existence of bilharzia with pulmonary tuberculosis has been noted. Five main clinical types have been distinguished:—(1) hepatic, (2) dysenteric, (3) dyspeptic, which often precedes the first two, (4) febrile, characterized by fever of long duration, (5) appendicular. Measures are being taken to prevent pollution of the water and the breeding of the intermediate host.

R. T. L.

RÍSQUEZ (Jesús Rafael). **Contribución al estudio de la anatomia patológica de la bilharziosis hepática en Venezuela.**—*An. de la Direccion de Sanidad Nac.* Caracas. 1919. July–Sept. Vol. 1. No. 3. pp. 257–259. With 1 text fig. [English translation, pp. 267–269.]

From 1915 to 1918 the author has had occasion to study in the Caracas Medical School the condition of the liver in 42 cases of infection by *S. mansoni*. In the present brief communication he summarizes the conclusions previously published in various monographs. Besides the cirrhotic lesion arising in the liver, all degrees of fatty degeneration may be observed. In no case has the author ever observed the classical lesions of the cirrhosis of Laennec.

R. T. L.

MIYAGAWA (Yoneji) & TAKEMOTO (Sakaye). **The Mode of Infection of** *Schistosomum japonicum* **and the Principal Route of its Journey from the Skin to the Portal Vein in the Host.**—*Jl. Path. & Bact.* 1921. April. Vol. 24. No. 2. pp. 168–174.

The authors differ from NARABAYASHI in his views upon the further migration of young bilharzia worms from the lung, where they have been carried by the blood stream. They believe from their series of experiments that the young worms penetrate actively into the skin, principally into the lymphatic spaces, then for the most part they invade the blood capillaries or the small peripheral veins, later gathering in the right side of the heart whence they pass to the lungs. They are arrested there for a short time owing to the disproportion in size of the worms and alveolar capillaries. Finally they reach the left side of the heart and are carried through the aorta to the wall of the gastro-intestinal canal, after passing through which they reach their permanent residence in the portal branches of the liver via the mesenteric vessels. Some of the worms in the systemic circulation reach the liver directly by the arteria hepatica.

R. T. L.

SANDERS (A. A.) & PRISTON (J. L.). **Schistosomiasis in the Yangtse Valley.**—*Jl. Roy. Nav. Med. Serv.* 1921. July. Vol. 7. No. 3. pp. 187–199. With 4 charts and 4 text figs.

Seven cases of *Schistosomiasis* (*S. japonicum*) occurred on board H.M.S. "Hawkins" as a result of a trip from Hankow to Shanghai in October, 1920. At Tatung, Kinkiang, Wuhu and Nanking officers landed for snipe shooting and waded in the marshes, especially near Tatung and Nanking. The incubation period for each case is given and in none was this more than 42 days. "The disease begins with an attack of fever with temperature between 100°–103° F., the face is flushed and there may be conjunctivitis and congestion of the fauces. The onset is usually gradual and as the disease develops there is a little dry cough and usually some abdominal discomfort with distension, flatulence and furred tongue." After a few days in bed the patient feels better and the temperature falls, but he is then much troubled with severe general urticaria which comes and goes. The eyelids, lips, fingers and even palms of the hands may be affected and it may come on at intervals during the first two months. When the temperature has fallen the patient gets up and about, but still feels far from well; the lassitude is out of all proportion to the febrile attack and he may have some diarrhoea. He may relapse with peasoup stools and signs of enteritis. There is a high degree of eosinophilia, reaching in some cases 65 per cent. The ova of the parasite may now be found in the faeces. In this series no blood has been detected in the discharges. Three of the eight cases completely recovered within two months of onset. No skin irritation at the time of immersion is recorded in these cases. Improvement is reported from the treatment of some of the cases with antimony intravenously, but the author says that it is impossible to draw any conclusions at present. A careful series of clinical records accompanies the general part of the paper.

R. T. L.

CHRISTOPHERSON (J. B.). **Bilharzia Disease in Egypt.**—*Brit. Med. Jl.* 1921. April 2. pp. 491–492.

The outstanding facts in the article by Drs. LASBREY and COLEMAN on 1,000 cases of bilharzia treated by antimony [see above] seem to the author to be :—

(1) The prevalence of the disease in and around Cairo; (2) the applicability of the treatment both in complicated and uncomplicated cases, on a large scale in Egypt; (3) the prestige of British doctors with the fellaheen at the present period of national unrest is proof against the prejudice aroused by religious and political mischief makers. The conclusion to which the author arrives is, that in order to eliminate the scourge it might be dealt with systematically on a much larger scale and steps might now be taken to get rid of it by supplementing the present stationary hospital arrangements—(*a*) by working through the country with mobile hospitals with attached laboratory; (*b*) by adopting measures for the destruction of molluscs and for preventing those which cannot be destroyed becoming infected; (*c*) by education of the fellaheen in the causes, prevention and cure of the disease.

R. T. L.

McWHAE (D. M.) & JAGGER (T. R.). **Bilharziosis in Western Australia.** —*Med. Jl. Australia.* 1921. Sept. 17. 8th year. Vol. 2. No. 12. pp. 217–219.

Following upon instructions from the Defence Department that all patients suffering from bilharziasis in Western Australia were to be collected in the Base Hospital, 11 patients have undergone treatment. All had been infected during 1916 in Egypt by bathing or washing in the freshwater canal at Serapeum or Tel-el-Kebir. Only one patient noticed the initial symptom of itching or burning after bathing. In five of the patients, urticaria, headache, general swelling, weakness, and influenzal symptoms occurred in from three weeks to three months. Haematuria developed in 10 patients, and was first noticed from one to six months after supposed date of infection. In one patient the infection appeared to be limited to the rectum; attacks of "dysentery" occurred every six weeks with bright red blood in the faeces. In three of the patients there were both rectal and vesical lesions. One has frequent attacks of renal colic. Miscellaneous symptoms, though slight in character, were common—chiefly lumbar and abdominal pain, pain along the urethra during micturition, precordial pain, palpitation, faintness and malaise. The patients were treated by intravenous injections of tartar emetic and received from 1·38 to 1·86 gm. This course proved insufficient to cure, and it is proposed to give a second course.

R. T. L.

DIACONO (B.) & MOREAU (R.). **Note sur un cas ectopique de bilharziose en Tunisie.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 437–439.

The paper describes a case of bilharziasis in Tunis which originated in Kairouan. Examination of the urine showed the presence of eggs of *S. haematobium.* Hitherto all the cases recorded in Tunis have acquired their infection in Southern Tunis.

R. T. L.

NICOLLE (Charles) & GOBERT (E.). **Sur la présence de mollusques de l'espèce** *Bullinus brocchii* **dans l'oasis de Gafsa, foyer de bilharziose vésicale.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 231–232.

Southern Tunis presents several centres of bilharziasis, the most important being Gafsa and its surroundings, Kebili and Nefzaoua and Djerid. Vesical bilharziasis is extremely common, while intestinal bilharziasis has only been observed three times, viz., at Degache, Kebili and Matmata. Investigations at Gafsa in April, 1921, showed the occurrence of *Bullinus brocchii* in the mud raised during the cleaning of the *mnaga* (stagnant extensions of an oasis watercourse) a short time before; the sole living specimen examined did not yield cercariae. The *mnaga* harbouring *Bullinus* are situated on the route from Gafsa village to the station. Children bathing in them quickly develop areas of irritation, which they scratch exceedingly. Observations made up to the end of June showed only the presence of empty shells; this species of snail is therefore a seasonal one.

R. T. L.

CAWSTON (F. G.).

i. *Schistosoma mansoni* **in South Africa.**—*Lancet.* 1921. Aug. 13. p. 332.
ii. **Introduction of** *Schistosoma mansoni* **Infection to South Africa.**—*Med. Jl. S. Africa.*—1921. June. Vol. 16. No. 11. pp. 209–210.
iii. **Schistosomiasis in Natal.**—*S. African Med. Rec.* 1921. Aug. 13. Vol. 19. No. 15. pp. 287–288.
iv. **Three Schistosomes in Natal which possibly attack Man.**—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. pp. 242–244. With 2 text figs.
v. **Experimental Infestation of Fresh-Water Snails.**—Reprinted from the *Trans. Roy. Soc. S. Africa.* 1921. Vol. 9. Pt. 4. pp. 301–303.

i. ii. iii. A boy who had suffered from constant haematuria of 18 months' duration, since bathing in pools at Sydenham, in Natal, was found to have both lateral and terminal spined eggs in the centrifuged urine. In these pools *Physopsis africana* had been found heavily infected with schistosome cercariae. The complement fixation test for bilharzia made by Dr. MURRAY gave a weakly positive reaction. There was an eosinophilia of 20 per cent. In another case, that of a child eight years of age, the haematuria was due in the main to *S. haematobium*, but a few eggs of *S. bovis* were also found; and in iv., illustrations are given of these eggs, which measured 0·2275 to 0·1925 mm. in length.

v. Repeated attempts to infest *Limnaea natalensis* with miracidia from *S. haematobium* have uniformly proved negative. In *Physopsis africana* bred from eggs mature cercariae were found six weeks after experimental infection with miracidia of *S. haematobium*. On experimental grounds the author states that *Physopsis africana* when only four months old is capable of harbouring the bilharzia parasite. He has demonstrated bilharzia infection in 30 laboratory-bred specimens of Physopsis four to six weeks after exposure to miracidia.

R. T. L.

CAWSTON (F. G.). **Bilharziasis, its Cause, Complications and Cure.**—*S. African Med. Rec.* 1921. Mar. 26. Vol. 19. No. 6. pp. 113–115.

Physopsis africana, a carrier of *Schistosoma haematobium*, has been found by the author in the Schoonspruit at Klerksdorp, also at Magaliesberg, Mulder's Drift, Scheerport and Rustenberg in the Transvaal; at Avoca, Pinetown, Sarnia, Sea View, Bellair, Sydenham, Palmiet, Mayville, Umgeni, Ottawa, Umbilo, Umlaas Bridge and Maritzburg in Natal. Among the complications of bilharzia infection the author notes that epileptiform fits and nervous twitchings undergo decided improvement in boys who have been cured by antimony treatment. Renal colic is a frequent complication. The frequency of appendicitis of bilharzial origin is commented upon. Dr. W. A. MURRAY has recently shown that the antigen prepared at Durban gives a positive reaction even in patients from the Far East who harbour *Schistosoma japonicum.*

R. T. L.

CAWSTON (F. G.).

i. **The Control of Bilharzia: Destruction of Molluscs.** [Correspondence.]—*Brit. Med. Jl.* 1921. Mar. 26. p. 479.
ii. **Wild Birds a Cause of the Spread of Bilharzia Infection.**—*Jl. Trop. Med. & Hyg.* 1921. Apr. 15. Vol. 24. No. 8. pp. 109–110.
iii. **Some Infections due to Fresh-Water Snails and their Eradication.**—*S. African Med. Rec.* 1921. Apr. 9. Vol. 19. No. 7. pp. 125–126.

i. ii. Many wild birds seen along the banks of rivers, particularly among the reeds, "carry in the mud attached to their claws numerous minute snails and the eggs of snails which have become attached to their claws whilst they are drinking water from the river." They therefore assist in the spread of bilharzia disease and should not be protected. Domesticated ducks and "millions" fishes can be safely recommended to keep down the infection.

iii. In this paper the author covers old ground.

R. T. L.

CAWSTON (F. G.). **Some South African Cercariae.**—Reprinted from *S. African Jl. Natural History.* 1921. June. Vol. 3. No. 1. pp. 199–204. With 1 plate.

Twenty distinct species of cercariae have been detected during the last two years in 5,000 freshwater snails collected from rivers along the East Coast of South Africa. Cercariae closely resembling "the Bilharzia" have been obtained from *Physopsis africana* (in nearly 30 per cent.), *Isidora tropica* (once), *Planorbis pfeifferi* (once), *Limnaea natalensis* (five specimens contained rediae with cercariae closely resembling the Bilharzia). The cercariae from *P. africana* give rise to numerous *S. haematobium* and *S. bovis* in guinea-pigs. Strong solutions of salt, fresh lime and tartar emetic have been shown to destroy the free-swimming cercariae. R. T. L.

PORTER (Annie). **The Invertebrate (Molluscan) Hosts of** *Schistosoma mansoni* **and** *Fasciola hepatica* **in South Africa.**—*Med. Jl. S. Africa.* 1920. Nov. Vol. 16. No. 4. pp. 75–76.

The cercariae of *S. mansoni* have been found twice in 1,050 specimens of *Physopsis africana* and in *Planorbis pfeifferi,* both obtained from pools in the Indian village of Mayville near Durban. The infection with *S. mansoni* in Natal appears to be relatively infrequent, as cases are rarely encountered. The South African molluscan hosts of *fasciola hepatica* have been determined, viz., *Isidora tropica* and *Limnaea natalensis.* [*Physopsis africana* at Durban has now been implicated in the spread of *S. haematobium, S. mansoni* and *S. bovis.*]

R. T. L.

CLAPIER (P. N.) **Contribution à l'étude de la répartition des Bilharzioses en Afrique équatoriale française.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 804–809.

French Equatorial Africa is surrounded by countries in which bilharziasis is common. In the equatorial zone itself there occur species of *Planorbis* and *Lymnaea, Melania tuberculata* and *Physa forskali,* which are known to be trematode intermediaries. In spite of these facts, observations made in the region of the Middle Congo have shown that infection is very rare, three cases only of vesical and one of intestinal bilharziasis being recorded from the entire Oubangui district and the Congo. Irébou was found to be a centre of infection, yielding five cases of intestinal bilharziasis due to *S. haematobium.* The scarcity of cases of parasitism is attributed to the possible limitation of the intermediate hosts to certain areas, to the extreme dilution of cercariae in the great rivers of this region, and to the fact that cases which form the sources of infection, coming from the Sudan and Nile valley, are not sufficiently numerous to contaminate these countries.

R. T. L.

i. BETTENCOURT (A.), BORGES (I.) & DE SEABRA (A.). **La bilharziose vésicale en tant que maladie autochtone au Portugal.**—*C.R. Soc. Biol.* 1921. Oct. 29. Vol. 85. No. 30. pp. 785–786.

ii. ——, —— & ——. **L'hôte intermédiaire du** *Schistosomum haematobium* **au Portugal.**—*Ibid.* Dec. 17. No. 37. pp. 1169–1170.

(i) An endemic focus for *S. haematobium* has been discovered at Santa Luzia near Tavira, in the province of Algarve, Portugal. Bifid-tailed cercariae were found in two specimens of *Planorbis corneus,* Linn.

var. ***metigensis***, Forbes, closely resembling those of *S.* ***haematobium***. The infected molluscs were collected from a place in Atalaija where women wash clothes and where infected persons bathe and even urinate. Conditions were unfavourable for the investigation and it was not possible to establish the connection with a specific intermediary beyond doubt.

(ii) Continuing their researches on the intermediate host of *S. haematobium* in Portugal, the authors have obtained cercariae emerging spontaneously or by dissection from *Planorbis corneus* var. *metidjensis*, Forbes, identical with those of *S. haematobium*, thus confirming previous suspicions that this mollusc acts as an intermediate host. Positive results were obtained in attempts to infect with these cercariae Planorbis taken from districts other than those in which schistosomiasis had occurred. Experiments with Physa gave negative results. Both *P. corneus* var. *metidjensis* and *Physa acuta* occur at Saint Luzia and Tavira, where the disease has been reported.

R. T. L.

Morin (G. H.). **Sur un procédé technique de recherche des oeufs de** *Schistosomum mansoni*.—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 328–331.

The following method is recommended as best for the finding of eggs of *Schistosomum mansoni*, but is inferior to Carles' method for Trichocephalus and Ankylostome eggs.

(1) Dilute a fixed amount of material (15–25 cc.) in serum containing 10 per cent. of formol to make a homogeneous emulsion.

(2) Filter once through metal gauze, and a second time through wide-meshed silk (Carles' filter—32 meshes per cm.).

(3) Catch the filtrate in a conical vessel and allow it to settle for about 15 minutes. With a fine pipette take up five drops from the bottom from five different points and make five preparations.

R. T. L.

Shaw (C. Gordon). **Cystoscopic Appearances in Bilharziosis.**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1, No. 5. pp. 85–86.

The author has studied the cystoscopic appearance in 23 cases of bilharziasis undergoing treatment with tartar emetic. In 11 cases in which there were active nodules before treatment these completely disappeared or were replaced by inactive atrophic granules. In two cases in which this was the main lesion the bladder was restored practically to normal. This change occurred at the same time as the disappearance of active ova from the urine. The polypi diminished appreciably in size, and in five cases completely disappeared. The infiltration diminished and signs of local subacute cystitis subsided. A most surprising improvement took place in the extensive areas which had undergone fibrosis and atrophy of the mucosa with more or less complete obliteration of vessels. These areas in many cases lost their dull, dead, white appearances and became pink. Not so marked an improvement occurred in the granulation tissue but the yellow nodules, the infiltrations and polypi did respond to a very striking extent.

R. T. L.

CROSS (K. Stuart). **Radiological Note [Bilharziasis].**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1. No. 5. p. 85.

A series of 21 cases of bilharziasis were examined radiographically in collaboration with Drs. SUMMONS and IRVING (*q.v.*). Eleven patients had lung symptoms—usually a chronic cough. All of these showed a generalized thickening and extension towards the periphery of the finer branches of the broncho-vascular tree, representing a generalized bronchitis. Several also showed focal involvement: (*a*) as groups of soft, discrete, spherical nodules of more or less uniform diameter of about 1 mm. usually situated in the lower lobes, and (*b*) as scattered, small, spherical or irregular linear or hook-shaped calcified foci, situated mainly in the upper lobes.

R. T. L.

POMARET & ANDRÉANI-CONSTANTINI. **Sur un cas de bilharziose vésicale mixte.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 567–568.

The authors cite an instance of the presence of eggs of *S. haematobium* and *S. mansoni* in the urine of a case of vesical bilharziasis in French West Africa. In a note at the end of the paper M. BRUMPT states that the faeces of the case also yielded eggs of both the above species.

R. T. L.

DES LIGNERIS (M. J. A.). **A Case of Schistosomiasis of the Female Pelvic Genitalia with Subsequent Tubal Pregnancy and Abortion.**—*Med. Jl. S. Africa.* 1921. Oct. Vol. 17. No. 3. pp. 46–48. With 2 text figs.

This case illustrates the localization of bilharziasis within the female genital organs, with resulting dysmenorrhea, oligomenorrhea, comparative sterility and tubal pregnancy with subacute symptoms of tubal abortion. The patient was an Indian woman coming from Madras. Examination showed that the ovary was the seat of bilharziasis. Macroscopically, part of the ovary appeared to consist of firm, scar-like, whitish tissue, which upon sectioning showed the typical granulation and cicatricial tissue of schistosomiasis. Masses of miliary tubercle-like formations, "endothelial leucocytes" and giant cells of Langhans type were adherent to 1–4 eggs of *S. haematobium.* The case is of interest in showing that bilharziasis may occur without manifest clinical signs in bladder or intestine.

R. T. L.

ANNANDALE (N.) **The Geographical Distribution of the Freshwater Gastropod Molluscs of the Indian Empire and its Direct Bearing on that of Human Disease.**— *Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 35–37.

In the Indian Empire most of the hill stations are practically safe from Trematode infection owing to the absence, or practical absence, of aquatic molluscs, while the whole of the plains of India proper are open to danger of infection, especially where bodies of still water containing abundant vegetation are present. There is very little danger from rapid-running water or from wells, and comparatively little from rice-fields owing to the limited period for which they are flooded.

The geographical range of species in the plains is extremely uniform. The number of common essentially tropical genera is small, and that of endemic genera still smaller. Bithynia and allied forms, Vivipara, Limnaea and Gyraulus [Planorbid] for the most part predominate.

R. T. L.

CHANDLER (A. C.). **Control of Fluke Diseases by Destruction of the Intermediate Host.**—*Jl. Agric. Res.* 1920. Nov. 1. Vol. 20. pp. 193–208.

This paper records the results of an attempt to find a cheap chemical substance, readily soluble in water, which would be destructive to snails in relatively weak solutions and would not render water either injurious or unpalatable for man or domesticated animals. A large series of chemicals were tested and it was found that copper salts have an extremely toxic effect on snails even in such great dilutions as one in a million of water. Mercury bichloride is the only other salt which was found to approach the salts of copper in toxicity, but it is not so effective, is more expensive and is more toxic to higher animals. Of the copper salts, copper sulphate is the cheapest. Snails of eight species belonging to six genera were used and were found to be similar in their susceptibility. All the species die within 48 hours in solutions of 1 in 500,000 and 1 in 1,000,000. Limnaea, Physa and Planorbis die within 48 hours in solutions of 1 in 1½ millions to 1 in 2 millions. All specimens revived after 48 hours immersion in a 1 in 10 million solution, although they became prostrate while in it. Basic sulphates or carbonates in alkaline solutions precipitate copper sulphate, as does also organic matter in solution. Algae absorb the salts of copper. It is believed that by this method Trematode diseases could be successfully brought under control.

R. T. L.

VEGAS (Martin.) **Algunos ensayos del tratamiento de la bilharziosis Mansoni por el emético.** [Some Trials of the Tartar Emetic Treatment of Intestinal Bilharziasis.]—*Gac. Med. de Caracas.* 1920. Mar. 31. Vol. 27. No. 6. pp. 69–74.

The paper consists in the main of clinical histories of eight cases—one that of the author himself—of *Schistosomum mansoni* infection treated by intravenous injections of tartar emetic. Treatment commenced with an injection of 2½ cgm. The dose was raised by increments of that amount until a maximum of 12½ cgm. was reached, each dose being given twice before increasing. The largest total dose given in any case was 75 cgm., and in this case eggs had disappeared from the faeces after 50 cgm. had been injected. In the earlier of his cases the author injected on alternate days, but in all his later cases, daily.

Our results accord, in the main, with those of the English doctors in Egypt. There are, however, some slight differences. The total dose employed by us, for instance, up to the disappearance of eggs, was uniformly less than that recorded by them, our largest total dose being 75 cgm. This meant a relatively shortened treatment. Further, in the majority of our cases 50 cgm. brought about the disappearance of eggs. The difference is perhaps explainable in this way. Most of the Egyptian observations relate to vesical bilharziasis and the *Schistosomum mansoni* is, perhaps, more susceptible to the action of tartar emetic than *S. haematobium.*

F. S. Arnold.

CHRISTOPHERSON (J. B.). **Demonstration of the Technique of the Intravenous Injection of Antimony Tartrate in Bilharzia Disease.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1921. June. Vol. 14. No. 8. pp. 18-21.

The technique recounted in this paper has already been summarized on previous occasions in this *Bulletin.* The two patients, on whom this was demonstrated, had contracted bilharziasis many years ago. One case was of 18½ years standing, the other 21 years. The author states that:—" In the average case of bilharzia where there is not much damage to the bladder wall, the urine will become quite clear and normal, to ordinary clinical tests, after 20 gr." To all intents and purposes he is cured after 25 gr. He will continue, however, to pass granular ova periodically in small numbers at intervals for two years or longer. In severe infections and in long standing cases where there are secondary organic changes in the bladder the urine will remain cloudy and occasionally clots may be found for some time after the injections have ceased. This is due to the granulations or papillomata on the bladder wall, which bleed; the blood clots or shreds of papillomata contain ova. This does not mean that the patient is not cured, but that nature is busy rectifying the secondary organic changes.

Relapses after 25 gr. of antimony tartrate are uncommon, but occur, and it would appear that some broods of bilharzia worms are more resistant than others. Neither colloidal antimony nor stibynal has come up to expectations as a substitute for tartar emetic.

R. T. L.

LASBREY (F. O.) & COLEMAN (R. B.). **Notes on One Thousand Cases of Bilharziasis Treated by Antimony Tartrate.**—*Brit. Med. Jl.* 1921. Feb. 26. pp. 299-301.

Since June, 1919, CHRISTOPHERSON'S treatment has been used as a routine for both urinary and rectal bilharziasis at the Church Missionary Society's Hospital, Old Cairo. One grain is given as the initial dose and is increased by ½ gr. at each injection to a maximum of 2·5 gr. on the fourth injection. Injections are given on consecutive days for the first six days and then on alternate days. Weak men and most women take slightly smaller doses. Children take much smaller doses in proportion to their size and condition. All cases in which there is much reaction, *e.g.*, fever, loss of appetite, etc., receive smaller doses, and some have longer intervals between the injections. The aim of the treatment is to secure a cumulative effect from about 20 gr. of the tartar emetic. In the total series of 1,000 cases there were 10 deaths, but many of the cases were physical wrecks. The usual symptoms preceding death are total loss of appetite, extreme debility and complete apathy. No death occurred immediately after an injection ; the patient generally curls up in bed, lives perhaps for some days and dies from syncope following sudden effort, *e.g.*, rising from bed. In cases of marked intolerance treatment should be immediately abandoned. The very marked relief of the symptoms results in a certain proportion of the patients discontinuing treatment. Of 630 cases dealt with in 1920, 20·6 per cent. did not take as many as six doses. Of 500 who persevered, 70 per cent. were pronounced cured. It is noteworthy that " the successful surgical treatment of complications dependent on bilharziasis, such as urinary fistulae and rectal papillomata, is enormously facilitated by the elimination of the causative factor."

R. T. L.

SANDERS (A. A.) & PRISTON (J. L.). **Notes on Treatment of Some Cases of Schistosomiasis.**—*Jl. Roy. Nav. Med. Serv.* 1921. Oct. Vol. 7. No. 4. pp. 290–292.

The authors summarize the after history of some cases of schistosomiasis contracted in the Yangtse [see above, p. 200].

"(1) Three mild cases of clinically diagnosed schistosomiasis received symptomatic treatment only and recovered rapidly: all are in apparently good health six months after infection.

"(2) Three moderately severe cases in whom ova were found received 2½ grm. of N.A.B. Live miracidia were hatched from two of these cases, in one case twelve weeks and in the other five weeks, after the last injection. The first of these is in apparently good health in spite of the presence of live ova. The other two were not much better after the course than before, and received further antimony treatment.

"(3) The above two cases and one other severe case each received from 21 to 24½ gr. of antimony tartrate intravenously. In each case the number of ova excreted was much diminished, and those found after the course all appeared to be dead.

"The severe case was strikingly improved in health and weight, and the other two are in good health but still below their original weight.

"(4) In all the cases, however treated, the eosinophilia has decreased fairly steadily throughout, and no particular kind of treatment seems to affect this decrease markedly."

R. T. L.

HARSANT (A. G.). **Bilharziasis amongst British Troops in Mesopotamia. Notes on the Treatment of Thirty-one Cases by Intravenous Injections of Tartar Emetic.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 376–381.

Thirty-one cases of infection with *S. haematobium* occurred amongst the British garrison on the Euphrates during the winter of 1920–21, probably acquired around Kufa and Kifl in baths filled direct from the river. In 24 cases symptoms commenced in from 6 to 15 weeks after their arrival in the Kufa area, but three cases showed no symptoms until the 23rd week. The ova found both in vesical and rectal cases were terminal spined. The results of tartar emetic injections are tabulated. The author notes as complications the development of otorrhoea, conjunctivitis, blepharitis and herpes towards or after the termination of the course of treatment. The one case known to have relapsed had had a full course of 14 injections and a total of 32 gr. of antimony tartrate, and was discharged after several negative examinations of urine. In a concluding paragraph the author makes reference to other 122 cases in whose urine ova were subsequently found.

R. T. L.

CAWSTON (F. G.). **A Series of Cases of Bilharzia Disease treated with Tartar Emetic.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 15. Vol. 24. No. 20. pp. 267–268.

A chart is given showing the age of the patient, duration of disease, amount of tartar emetic given and the date upon which ova ceased to appear in the urine. The history of the 25 cases quoted shows that a total of 12 gr. of antimony tartrate given in doses thrice weekly extending over a month should suffice to effect a permanent cure.

R. T. L.

CAWSTON (F. G.). **The Treatment of Fluke Diseases.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 1. Vol. 24. No. 19. pp. 254–255.

The author has followed up a series of 100 cases of *S. haematobium* infection which have been treated with tartar emetic, and believes that if treatment is maintained for a complete month the patients are no longer capable of spreading the disease. An equal number of cases have been treated with ipecacuanha, and this would appear to be equally effective.

R. T. L.

BAUJEAN (R.). **Traitement des Bilharzioses intestinale et vésicale, par l'émétique en injections intraveineuses.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 299–307.

Tartar emetic has been used successfully by the author in six cases of vesical bilharziasis and 12 cases of intestinal bilharziasis at the Colonial Hospital at Dakar. Instead of a solution of the salt in distilled water, which it was necessary to dilute at the time of injection, the author used a more concentrated solution made up of 0·02 gm. of tartar emetic for each cc. of physiological saline. Flasks of from 30 to 60 cc. according to requirements are prepared and are sterilized at 120° C. The solution is then used for intravenous injection. 1·5 cc. of this solution contains about ½ gr. of tartar emetic. Three of the 18 cases suffered from symptoms of general ill-health and treatment was abandoned. The good results were much more apparent in the vesical than in the intestinal cases, but in the latter it is necessary to note the gradual improvement in the clinical symptoms and in the character of the stool which corroborates the negative results of microscopical examinations In six out of twelve of the cases bilharziasis was the sole cause of trouble. In other cases, however, the syndrome of intestinal symptoms is partly due to associated parasites, *e.g.*, amoebae and ankylostomes. It is advisable to cure the patient by treatment with emetine and thymol prior to the course of antimony.

R. T. L.

HODSON (V. S.). **The Action of Tartar Emetic in Bilharziasis.** [Correspondence.]—*Lancet.* 1921. July 9. p. 97.

The author considers that the bilharzia worms and not the eggs are primarily affected in treatment by tartar emetic. He judges that the usual time taken for a crop of eggs to pass from the worm to the urine is from five to seven days, and this is the period within which improvement takes place after tartar emetic. Improvement similarly follows confinement to bed on a fluid diet, but there is a relapse in this event on return to a full diet.

R. T. L.

SUMMONS (Walter H.) & IRVING (Harold). **Observations on the Treatment of Egyptian Bilharziasis by Tartar Emetic.**—*Med. Jl. Australia.* 1921. Jan. 29. 8th Year. Vol. 1. No. 5. pp. 83–85.

The complete cure by tartar emetic of 30 cases of bilharziasis contracted in Egypt is recorded. In 26 of the patients microscopical examination demonstrated the presence of ova. In the remaining four the diagnosis was based on the history and present symptoms confirmed by cystoscopic examination and the finding of a definite eosinophilia. Although only lateral spined eggs were found originally in some of the cases, terminal spined eggs appeared later in many. The symptoms usually complained of when the patient came for treatment were terminal haematuria, either continuous or intermittent, occasional diarrhoea with blood in the stool, and cough. The men were in many cases obviously anaemic and debilitated. Twice after treatment was commenced, while blood for films was being taken from the fingers of patients to make differential leucocytic counts, ova were found in the films, on occasion as many as six. There was a high eosinophile count, which was of value in confirming the diagnosis in those cases whose excreta did not contain ova at the time of admission to hospital.

R. T. L.

PAVY (Harold K.). **Intravenous Injections of Antimony Tartrate in the Treatment of Bilharziosis.**—*Med. Jl. Australia.* 1921. Aug. 27 8th Year. Vol. 2. No. 9. pp. 155–162.

Ten cases of urinary bilharziasis have been treated during the past six months at No. 7. Australian General Hospital, Keswick. The results and various examinations were tabulated. The author describes the method adopted and the effects and results of treatment, giving the individual records of each case. The average dose of tartar emetic before the urine was negative was 0·72 gm. The average amount given was 1·62 gm. In all, the ova had disappeared or were dead by the end of the course. All the cases originated in Egypt.

R. T. L.

KHALIL (M.). **Observations on the Effect of Tartar Emetic on the Eggs and Miracidia of** *Bilharzia haematobia.*—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1922. Feb. Vol. 15. No. 4. pp. 13–15. With 1 text fig.

The therapeutic action of tartar emetic in bilharzia disease is strikingly confirmed by various clinical observers but has not yet been explained in scientific terms. It has been claimed that antimony is lethal to the adult worms in the portal system and to the ova in the tissues and urine, and CHRISTOPHERSON has recorded certain *in vitro* experiments upon the eggs and miracidia in support of this claim. The validity of these experiments is questioned by Khalil, who shows that "tartar emetic as used in these experiments acts by virtue of its being a salt and not as the specific drug that kills the bilharzia worms and their eggs inside the body." The miracidia are not affected by tartar emetic in a dilution approximating to that used during treatment.

R. T. L.

RISQUEZ (Jesús Rafael). **Un accidente ocurrido durante el tratamiento con el emético.**—*Gac. Med. de Caracas.* 1920. Mar. 31. Vol. 27. No. 6. pp. 74–75.

An account of a case of bilharziasis in which, about half-way through a course of tartar emetic injections, the patient, a man, had a severe rigor shortly after an injection of 9 cgm., he having received 8 cgm. the previous day without ill effect. The patient's appearance was that of a man at the commencement of a malarial attack. Severe pain round the waist and in the muscles of the thigh now came on, the temperature began to rise and in a few minutes reached 104° F. and the patient had two bilious vomits, pulse 132. The blood was examined, but no malarial parasites were found. The next morning the temperature was normal. For some days the patient complained of extreme debility and severe pain in the trapezius. Recovery was complete at the end of a week.

F. S. Arnold.

TSYKALAS. **Neue Wege in der Behandlung der Bilharziakrankheit in Aegypten.** [New (Emetine) Methods of Treatment of Bilharziasis in Egypt.]—*Wien. Klin. Woch.* 1921. Dec. 1. Vol. 34. No. 48. pp. 579–580.

The author advises the use of emetine in the treatment of bilharziasis. A total amount of 1·0–1·2 gm. emetin is injected intravenously during the course of 8–10 days (0·1–0·12 gm. per day). This method has usually no bad consequences, whereas if the same total amount is given in smaller doses (0·05–0·06 gm. per day) spread over 20 days, or 0·1 – 0·12 gm. given every other day, severe symptoms occur and death may even result. Emetine not only cures the haematuria but kills the eggs and embryos enclosed in the eggs. This treatment lasts in slight and average cases 8–10, in severe 12 days—in women and children 6–8 days. If symptoms of intoxication, such as diarrhoea and sickness, arise after eight days the treatment is stopped. Should the haematuria still continue it can be assumed that the bladder and kidneys are organically involved and must be treated locally. Out of 2,000 cases so treated with emetine 90 per cent. showed a complete and lasting cure.

R. T. L.

MAURIAC (Pierre) & BOYER (R.). **Recherches expérimentales sur le traitement de la distomatose par les injections intraveineuses d'émétique.**—*C.R. Soc. Biol.* 1921. Nov. 17. Vol. 85. No. 33. pp. 197–199.

Eggs of *Fasciola hepatica* having been found in the stools of a patient, the authors decided to treat the case with tartar emetic and to carry out parallel experiments on sheep at the same time. Four sheep were chosen whose stools contained eggs of *Fasciola hepatica, Dicrocoelium lanceatum* and a strongyle. The injections of tartar emetic were made intravenously in a solution of 4 per 100. Three animals received 86, 216 and 371 cgm. respectively without apparent injury to the flukes. The fourth was used as a control.

The patient received 10 successive injections of 1–9 cgm. with a total of 60 cgm. Toxic symptoms were shown after the dose of 7 cgm., and were serious with the dose of 9 cgm. At the end of the treatment eggs were still found, although for a day or two they appeared degenerate. A further series of injections were made three weeks later with similar results, eggs persisting in the stools up to the death of the patient in October.

These experiments all show the uselessness of intravenous injections of tartar emetic in the treatment of human and ovine distomiasis.

R. T. L.

SERVANTIE (Louis). **Recherche de la déviation du complément dans la distomatose humaine.**—*C.R. Soc. Biol.* 1921. Apr. 16. Vol. 84. No. 13. pp. 699–700.

In the faeces of a woman, 28 years old, the eggs of *Fasciola hepatica* were found. This is a very rare human parasite in France, and hitherto no one has arrived at a diagnosis by the application of the deviation of complement test. A single experiment only was attempted, sheep fluke antigens gave a positive result with syphilitic serum and with the patient's serum. Hydatid fluid gave a positive result with the patient's serum but not with the syphilitic serum. Very varying results ranging between complete haemolysis and total absence were obtained with human red cells and the serum of fluke infested sheep. A fuller account is promised of these observations when completed.

R. T. L.

JACKSON (Harold G.). **A Revision of the Genus** *Fasciola.* **With Particular Reference to** *F. gigantica* **(Cobbold) and** *F. nyanzi* **(Leiper).**—*Parasitology.* 1921. Mar. Vol. 13. No. 1. pp. 48–56. With 1 plate and 4 text figs.

The type of *F. gigantica* has been re-examined and the author considers that no important character separates *F. angusta* (Railliet) and *F. aegyptiaca,* Looss, from this species. In this he confirms generally accepted opinion.

R. T. L.

NAKAGAWA (Koan). **On the Life Cycle of** *Fasciolopsis buski,* **Lankester.**—*Kitasato Arch. Experim. Med.* 1921. Mar. Vol. 4. No. 2. pp. 159–167. With 1 plate.

Human cases of *Fasciolopsis buski* are unknown in Formosa but pigs are frequently infested. The eggs hatch in the summer in from two to three weeks. The miracidia under experimental conditions penetrate *Planorbis coenosus, Segmentina largillierti, Planorbis compressus* and *Limnaea pervia.* In the first two species the author has studied the development onwards to the cercariae. This follows closely the metamorphosis of *Fasciola hepatica.* The miracidia leave their ciliated coats as they penetrate the snail. In seven days after infection the rediae are found in the sporocysts and they migrate as far as the mantle or into the wall of the alimentary canal. On the ninth day the largest rediae measure 0·42 mm. by 0·17 mm. In ten days some of the rediae have reached the liver. In 14 days the largest rediae measure 0·5 mm. On the 35th day young cercariae develop and in a number of cases daughter rediae are also seen. Each redia contains about 4–7 cercariae. The fully grown cercariae measure 0·21–0·23 mm. in length and 0·12–0·15 mm. in breadth. The oral sucker has a diameter of 0·04 mm. The ventral sucker is 0·03 mm. in diameter. Soon after liberation the full-grown cercariae attach themselves to grass and encyst. The encysted cercaria is disk-shaped, 0·13–0·135 mm. in diameter. The excretory organ is filled with coarse granular substance characteristic of this species. Similar cercariae were found in April in the watersnails collected in a small pool in Ronnansho village, near Shinchiku (Formosa), where the pigs are abundantly infested. By feeding dogs and pigs with encysted cercariae the author succeeded in raising fully grown specimens of *Fasciolopsis buski.*

R. T. L.

BARLOW (Claude H.) **Experimental Ingestion of the Ova of** *Fasciolopsis buski*; **also the Ingestion of Adult** *Fasciolopsis busti* **for the Purpose of Artificial Infestation.**—*Jl. Parasit.* 1921. Sept. Vol. 8. No. 1. pp. 40–44. With 2 text figs.

In order to have some time basis for the dismissal of patients from the wards it was desirable to find out the time required for the stool to become ova-free after treatment. The eggs and some living adults of *Fasciolopsis busti* were experimentally ingested by the author. The eggs, which were washed and then swallowed in ordinary gelatine capsules, appeared on the same or the following day and in eight days had disappeared. From their appearance when voided they apparently received no hurt in the stomach from the digestive fluids. No eggs were found in the stool after the first ingestion of mature adults and it is possible that these were digested, as they had been swallowed on an empty stomach. A later attempt proved more successful and 28 hours after swallowing three live flukes, one of which lodged and became parasitic, ova appeared in the stool and did not disappear till a year later when expelled by an anthelmintic. The eggs obtained from this single fluke were fertile.

R. T. L.

COLE (A. F.). **Five Cases of Fasciolopsis Infection, with Remarks.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Feb. 18. Vol. 14. No. 6. pp. 93–96. (Discussion pp. 96–98.)

From studies of sections, longitudinal, transverse and horizontal, the author failed to observe any difference of moment between the so-called *F. busti, rathouisi* and *goddardi* types. The clinical notes of the five cases suggest to the author the following conclusions :—

"(1) The parasites live in the stomach, duodenum and the first part of the small intestine only ; when found in the large bowel they are nearing the end of their existence.

"(2) Their ill effects are not in the direction of blood destruction, but are produced by toxic absorption, which leads to secondary anaemia, dyspnoea, general oedema, ascites, and skin changes. There is no fever directly caused by them.

"(3) No melaena has been noted, even in the massive infection case 729. Diarrhoea is common. Many of the patients state they have passed blood, but a freshly passed fluke in a mass of pultaceous faeces exactly simulates blood clot ; moreover, there is a Chinese proverb : 'Ten men, nine haemorrhoids ; Ten women, nine leucorrhoeas' ; which bears on the subject of melaena.

"(4) No cases were observed in infants or young children ; this may be connected with the fact that weaning is often delayed to the third and fourth year.

"(5) The disease may be fatal unless the parasites are expelled by art or by accident. I had one death (not here recorded) within twenty-four hours of admission for bowel troubles, in which the typical ova were demonstrated before death.

"(6) Rapid recovery follows when the parasites are evacuated, unless the patient is in the later stages of exhaustion.

"(7) Faecal examination and re-examination are the essentials for success, the fasciolopsis ova being characteristic. Certain observations were made on the relative sizes of ova *in utero* and in the faeces ; also in the analogous case of *Fasciola hepatica* infection in the pig of Shanghai abattoirs."

R. T. L.

SWEET (W. C.). *Fasciolopsis buski* **Infestation.**—*Jl. Amer. Med. Assoc.* 1921. June 25. Vol. 76. No. 26. pp. 1819–1820.

The frequency of fasciolopsis infestation in the Shaohsing district is remarkable. In 732 first examinations of stools from hospital and dispensary patients in one year 71·5 per cent. were positive. A new series of cases is given. Of 1,143 patients seen between 31 December, 1918, and 1 January, 1921, 40·8 per cent. had fasciolopsis ova in their stools. In 52·4 per cent. of the patients no symptoms were referable to the parasites. In cases of long standing there is oedema of the face, hands, and feet, enlarged and pendulous abdomen, epigastric distress of an indeterminate type and loss of strength. Five of the patients vomited flukes; 58·7 per cent. gave an eosinophilia of over 8 per cent. The treatment given is Beta-naphthol, usually in a dose for adults of from 10 to 15 gr. in three parts, followed by salts. Two treatments are necessary in most cases. The largest number of flukes passed in the above series of cases was 1,104.

R. T. L.

ARCHIVES DE MÉDECINE ET PHARMACIE NAVALES. 1921. July–Aug. Vol. 111. No. 4. p. 324.—**Troubles déterminés par** *Fasciolopsis fülleborni.*

A case is briefly noted of a young student who had had chronic fever and persistent diarrhoea for some years. *Plasmodium vivax* was found in the blood and a course of quinine instituted, which only ameliorated the condition. The stools were found to be free from amoebae but to contain eggs of Fasciolopsis. The evacuation of a considerable number of flukes after the administration of thymol caused a disappearance of the fever and the diarrhoea.

R. T. L.

KOBAYASHI (S.). **On the Development of the** *Paragonimus westermanni* **and its Prevention.**—*Japan Med. World.* Tokyo. 1921. May 15. Vol. 1. No. 1. pp. 14–17.

Paragonimiasis is found in all parts of Korea. More than half of the population is affected where it is prevalent. There are many deaths, but in some cases patients are not aware of the infection and engage in the daily toils of healthy people. From experimental studies the author is led to believe that the early stages of the infection are the most harmful and are often considered as a simple pneumonia. The parasites occur in dogs, cats and other carnivora, and in Korea there are no distinguishing features between those infesting man and animals. The development of the egg is retarded by cold. 25° to 30° C. is the optimum, and in Korea July and August are the most favourable times. A free supply of oxygen is not essential to development. Under the most favourable conditions miracidia hatch in about 16 days. The miracidium becomes a sporocyst under the skin of the mollusc. Only one of the several rediae it produces comes to maturity. This gives rise to several daughter rediae from which cercariae with short tails develop. The time required for an egg to become cercariae in the primary intermediary is over one year. Several fresh-water crabs act as secondary intermediaries, but fresh-water shrimps are said not to harbour the parasite. The encysted form is 0·3 to 0·4 mm. in diameter. In the second host the cercaria takes about 30 days to mature and become encysted. It can there remain alive at least for six years. Encysted forms only leave the crab accidentally. They enter man within the tissues in which they are encysted. After being freed in the intestine the young forms pierce the intestinal wall, enter the abdominal cavity, whence they migrate through the diaphragm to the pleural cavity, and so enter the lung. Extensive damage is caused during this migration.

Infection takes place chiefly through eating infected crabs, for the larva when it has escaped into water does not live long. The Koreans eat fresh crab as an antipyretic and antidiarrhoeal remedy. Control of the disease by control of the eggs passed in sputum and faeces is rendered difficult by the infection of domesticated animals in the endemic region. Extermination of the crabs is next to impossible, owing to their harbouring in the deep holes and under the stones in the river-beds. The extermination of the molluscs is also very difficult. Owing to the area involved the general use of chemicals is not recommended. Collection by labourers can be attempted and one can cover three or four square miles in a day. Popular education *re* the causal agents of the disease is helpful.

R. T. L.

KAWAMURA (Rinya) & YAMAGUCHI (Masamichi). **On the Pulmonary Distomiasis which caused Brain Symptoms in Children.**—*Japan Med. World.* 1921. Aug. 15. Vol. 1. No. 4. pp. 1–7. With 1 text fig.

The 38 cases of Paragonimus infestation of the brain, of which the authors have traced records in previous publications, represent a small percentage compared with the wide incidence of the lung disease due to this parasite in Formosa, Korea and Japan. During 1916–17 many cases of disease occurred among children which was diagnosed as cerebral infantile paralysis, cerebral haemorrhage, encephalitis, or acute meningitis. This curious disease which had been so variously diagnosed was later found to be due to Paragonimus in the brain. In a village of 686 inhabitants 11 cases of brain complications were found among children; clinical records are given of each case. The great majority of the cases seen had contracted the disease before the age of 15. The earliest cases were three to five years old. These are the outstanding clinical features:—

> "It begins with sudden severe headaches with vomiting and dizziness. In many cases there are epileptic attacks with loss of consciousness and at times with delirium. At times there are also tonic or clonic spasm with aphasia or motor paralysis. These attacks are repeated several times and may last from one to two hours or as long as ten or fifteen days. Some of the epileptic attacks are distinctly Jacksonian type. Various symptoms at the time of the onset disappear gradually, but some of the cases may retain disturbances of sensations or movements of extremities. In rare cases aphasia may develop or may have disturbances or loss of sight. Mentality is weakened in some cases and in worst cases they become idiotic."

Not a few die during the period of these attacks. Physical changes in the lungs develop in more than half of the cases. In more than half of the brain cases physical changes in the chest and eggs in the sputum were found.

R. T. L.

KIMURA (Onari). **A Case of Cysts in the Brain caused by** ***Paragonimus westermani.***—*Mitt. a. d. Pathologischen Inst. der Kaiserlichen Univ. z. Sendai, Japan.* 1921. Vol. 1. No. 2. pp. 375–384. With 6 text figs.

Whereas in Europe helminth parasites of the central nervous system are larval tapeworms—either Echinococcus or Cysticercus—in Japan the parasites found are the adults or eggs of flukes, viz., *Schistosoma japonicum* and *Paragonimus westermani.*

The author describes in detail the results of his examination of the brain of a Japanese policeman, aged 43, in which were found great numbers of cysts due to *Paragonimus westermani.* The patient had had haemorrhage from the lungs at the age of 20 and his case had been then diagnosed as pulmonary distomiasis. Three months prior to death mental peculiarities, optical illusions and hallucinations had been noticed. At post-mortem a tumour, the size of the tip of the thumb, was seen on the left upper surface of the tentorium cerebelli, consisting of several smaller tumours ranging from the size of a pea to that of a millet-seed. Most were globular and greyish in colour and loosely united by loose soft fibrous connective tissue. The largest of these tumours measured about 20 mm. in diameter, its capsule of tendinous connective tissue was fully 1 mm. thick and was sharply defined. The surrounding nervous tissue is replaced by fibrous structures somewhat brownish in colour which probably is glia tissue. More than a dozen cysts occupied the entire lateral half of the left occipital lobe, the largest measuring about 3 × 1·5 cm. Most of the cysts are connected by small canals or by fibrous bands. All the gyri are seriously atrophied through pressure. The white matter is more impaired than the grey. Large numbers of eggs are found in the neighbourhood of the cysts and are surrounded by connective tissue.

Discussing the pathogenesis of the alterations caused by Paragonimus, the author supposes "that the worms had arrived first at the furrows of the brain and built cysts there; but some of them had either crept further through the blood vessels or actively pierced the brain substance to the more or less deep layer (white matter) and caused there the building of the cysts." The cause of the enlargement of the cysts is not quite clear. The connective tissue is proliferated round the path of the worms, and the cysts form where the eggs are deposited or where the worms have remained for some time or have died.

R. T. L.

ONJI (Y.). **Das Lungen-Distoma, der Schmarotzer wilder, krabbenfangender und -verzehrender Tiere. I. Mitteilung.** [The Lung Distome, Natural Parasite of Animals which catch and eat Crabs. Part I.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 500–505.

Paragonimus westermani has been found by the author in weasel's faeces and "racoon dogs" in Japan. Other wild animals which eat crabs are otters and bears, boars and monkeys; these are also probably natural hosts. In places where these wild animals are infected, numbers of eggs must be continually cast into the streams; the miracidia which develop from them seek and find the first intermediary host, a water snail, two species of which are definitely known —(1) *Melania paucicincta,* Martens; (2) *Melania extensa,* Martens. The secondary hosts are crabs—(1) *Geothelphusa dehaanii*; (2) *Eriocheir* *japonicus*, which eat these snails. As man does not eat raw crabs, he does not enter into this cycle; but when crabs die in the stream the drinking of such water without boiling may be the source of human infection.

R. T. L.

MUTO (M.). **[Examination of Domestic and Wild Animals in the Districts where Clonorchiasis prevails.]**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. July 31. No. 2188. pp. 1443-52.

The frog is quite free from *Clonorchis sinensis*. The encysted young are mostly set free inside the digestive canal of the frog, but they are sooner or later discharged with the excreta. In the rat the distome in question was found in more or less 50 per cent. and the eggs were abundantly found in the faeces.

The cat seems to be affected by the distome without exception. In an old individual the liver showed a change which though apparently due to the infection of Clonorchis healed afterwards, and such an individual is free from the distome. The author suggests that this may be regarded as a case of immunization. Besides Clonorchis, there were found in cats, eggs of other parasites, such as a liguloid Cestode, Tabé's *Echinochasmus*, Yokogawa's *Metagonimus*, *Heterophyes*, etc. The dog exhibits features similar to those seen in the cat, viz., the Clonorchis eggs were found in all cases examined, and there were indications of immunity in older individuals. No liguloid Cestode was found, but Echinochasmus, Metagonimus and Heterophyes were proved to be present. The weasel seems to be free from Clonorchis so far as the author could judge from examination of two individuals.

Hiroshi Ohshima.

MEBIUS (J.). **Clonorchiosis hepatis, cirrhosis parasitaria en typische groei van het galgangepitheel.** [Clonorchiasis hepatis, Parasitic Cirrhosis and Typical Proliferation of the Bile-duct Epithelium.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1920. Vol. 60. No. 2. pp. 224–294. With 3 plates.

This is a detailed study of *Clonorchis sinensis* and *Opisthorchis felineus* from the clinical, anatomo-pathological and parasitological point of view. Clinical histories and accounts of post-mortem appearances are given of five Chinamen in whom *Clonorchis sinensis* was found in the bile ducts. A description is given of the anatomical changes brought about by the activities of the worm. Besides a proliferation of epithelium, in the form of epithelial crypts in the wall of the bile duct, there is also found a thickening of the walls and an enlargement of the lumen of the intrahepatic bile ducts, and, further, a proliferation of the peri-portal connective tissue with lymphocyte infiltration. Atrophy of the liver cells is a natural consequence. In two of the cases there was connective tissue proliferation round the venae centrales, in the others thickening of the walls of the latter vessels. The condition may be summed up as hyperplastic cholangitis with chronic fibrous hepatitis. In one case a cirrhosis developed, associated with icterus and portal congestion of which the patient died. The plates illustrate respectively the macroscopic appearance of an infested liver, the adult *Clonorchis sinensis* and *Opisthorchis felineus* and the eggs of the two parasites.

F. S. Arnold.

BRUG (S. L.). **Un cas grave de clonorchiase traité par l'émétique. Guérison.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 161-162.

A recent case of Clonorchis infection in a Chinaman was successfully cured by the injection of 2·95 gr. of tartar emetic spread over a period of three months. Before treatment the left lobe of the liver was enlarged, hard, and painful; the spleen swollen; there was fever, anaemia, ascites and a variable amount of oedema of the upper and lower limbs. The prognosis was considered serious. After the course of treatment not only had the symptoms subsided but eggs of Clonorchis could no longer be found in the faeces.

R. T. L.

MUTO (M.). **Experiments on the Filtration of Water containing Encapsulated Larvae of** *Clonorchis sinensis.*—*Japan Med. World.* Tokyo. 1921. May 15. Vol. 1. No. 1. pp. 8-11.

A series of experiments is detailed which indicates that the encapsulated larvae of the Asiatic liver fluke are not entirely removed from water after filtering through a sand bed of two feet of rather coarse sand. With sand the grains of which pass a mesh of 0·15-0·2 cm. their passage is prevented.

R. T. L.

BRUMPT (E.). **Mode de pénétration des nématodes dans l'organisme des mammifères, histotropisme et histodiagnostic.**—*C.R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 203-206.

The author has used the phenomenon of histotropism, *i.e.*, tissue attraction, to further knowledge of evolution and migration of nematodes parasitic in man and animals. Larvae seem to migrate into the tissues to escape from unfavourable conditions. A freshly excised piece of calf's umbilical cord was found to exercise a great attraction on larvae of *Strongyloides vituli*, whereas they were indifferent to fragments of mouse organs.

In several hours hundreds of larvae are found in the umbilical cord—nevertheless 99 out of 100 do not show this tactism but remain in the culture. If these indifferent larvae are injected into the rectum of a rat they all bury themselves in the mucous membrane to escape from the rectal contents. Similar "indifferent" larvae injected into a rabbit *per os* migrate into the buccal mucous membrane, oesophageal wall, and pyloric region of the stomach. A mouse may die in two hours showing hundreds of larvae in mediastinum, diaphragm, eyeballs and some in the brain, although none are found in the liver, which shows that the larvae travel via the tissues and only rarely by the blood stream. This experiment shows that larvae which seemed incapable of traversing umbilical cord and skin can infect animals when passively ingested by them. Human umbilical cord was attracted and penetrated by: *Necator americanus*, *Strongyloides papillosus*, of the sheep and rabbit *S. stercoralis*, *S. suis*, *S. vituli*, S. sp. from a Macacus, S. sp. from a Cercopithecus, *Strongylus equinus* and *S. vulgaris* of the horse, *Characostomum longemucronatum* of the pig, *Trichostrongylus* (*retortaeformis ?*) of the rabbit, and by a larva of a sheep parasite (*Chabertia ?*). Umbilical cords of calves and sheep gave similar results.

The author, arguing from a control experiment on his own skin with larvae of *Strongyloides vituli*, maintains that larvae which can penetrate the umbilical cord are normally capable of penetrating the skin. Out of 16 species of larvae 12 showed histotropism, from which it is deduced that larvae make migrations in their hosts before reaching the adult stage. The experiments show that worms which do not normally infest man are capable of migrating amongst the tissues as if they were in their habitual host.

R. T. L.

SCHWARTZ (Benjamin). **Effects of Secretions of Certain Parasitic Nematodes on Coagulation of Blood.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 144–150.

It is probable that the toxic secretions of nematodes, like snake venoms, are a complex of a number of different principles, such as haemolysins, anticoagulins and one or more systemic poisons. It is of interest that nematodes that contain anticoagulins also contain haemolysins from which they are probably chemically distinct. The author finds that the substance which inhibits coagulation of the blood is present in the posterior as well as in the anterior portion of species of Strongylus. So far as present knowledge goes the nematodes which contain substances that inhibit coagulation of the blood to a marked degree belong to the family Strongylidae, the members of which have a buccal capsule adapted to lacerate the mucous membrane. The injection of these secretions into the intestinal mucosa by certain biting nematodes, resulting in minute haemorrhages, is probably of etiological importance in nematode diseases.

R. T. L.

LEGER (Marcel). **Présence dans les matières fécales, à la Guyane, d'oeufs de nématodes indéterminés.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 155–159.

During microscopical examinations of 5,000 stools in French Guiana three unrecognized varieties of nematode eggs were noted—(*a*) A large egg of Ascaris type, 100 to 110 μ × 70 to 40 μ, seen on four occasions. The author suggests a resemblance with the eggs of *Ascaris megalocephala* of the horse. (*b*) On two occasions an egg similar to *Necator americanus*, but much larger, viz., 88 μ–57 μ, was found and cultivated. The adult was probably a Trichostrongylus. (*c*) On one occasion an Oxyuris-like egg of large dimensions, viz., 125–130 μ × 75 μ–80 μ, ovoid, with one pole more elongated than the other.

R. T. L.

NEVEU-LEMAIRE. **L'infestation congénitale de l'homme et des animaux par les nématodes.**—*Bull. Acad. Méd.* Paris. 1921. May 31. Vol. 85. No. 22. pp. 632–634.

Congenital infestation with Ascaris, Ankylostomes, Strongyloides and all forms of bursate nematodes will probably be found to be much more frequent than is generally supposed, especially in warm countries.

R. T. L.

SHIMURA (Sôhei) & OGAWA (Teruji). **[On the Filariform Larvae found in Vomit of a Patient infested with** *Strongyloides.*]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. Oct. 2. No. 2197. pp. 1829–36.

A great number of rhabditiform larvae were found in the faeces of a man of 46 who had been suffering from chronic bronchial catarrh, chronic enteritis and nephritic cancer. In the faeces were found also numerous larvae of *Strongyloides stercoralis,* besides a few eggs of *Ancylostoma duodenale* and *Ascaris lumbricoides.* Eggs and rhabditiform larvae of Strongyloides were found fairly numerously in the vomit. Moreover, in the mucous substance, which the authors regard as sputa mixed with vomit, there were discovered two individuals of filariform larvae. The eggs and rhabditiform larvae seem to have been produced by *S. stercoralis,* which lived in or near the duodenum. On the other hand it is highly probable that the filariform larvae are on the way of self-infection, and came through the lung.

Hiroshi Ohshima.

ROUSSEAU (L.). **Le parasitisme par les anguillules en Guyane.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 124–132.

Examination of the convict population of French Guiana showed the presence of infection by *Necator americanus, Ancylostoma duodenale* and *Strongyloides stercoralis.* The intestinal forms of *S. stercoralis* cause emaciation and diarrhoea, and in two cases they greatly aggravated amoebic dysentery.

To determine the presence of *S. stercoralis* with certainty, a stool in which ankylostomes may possibly occur in addition should be examined not later than six hours after passing. Otherwise, one may obtain embryonated eggs or free ankylostome larvae, which in early stages are extremely difficult to distinguish from *S. stercoralis.* At a temperature of 27°–28° C., ankylostome eggs give rise to free larvae in 24 to 48 hours; these differ from the rhabditiform larva of *S. stercoralis* in the granular nature of the posterior part of the digestive tube, and in the scarcely marked rhabditiform oesophagus. The larva of *S. stercoralis* gives either a sexual form in 48 hours, or a strongyloid larva within the same period.

R. T. L.

BRUMPT (E.). **Recherches sur le déterminisme des sexes et de l'évolution des anguillules parasites (Strongyloïdes).**—*C.R. Soc. Biol.* 1921. June 25. Vol. 85. No. 23. pp. 149–152.

Strongyloides papillosus of sheep can develop in the domesticated rabbit. The author has found that whereas in sheep the parthenogenetic worm gives rise to eggs which develop into 2,000 females for every male and from 200 to 100,000 larvae by direct development, the parthenogenetic worm in rabbits gives 237 males to 409 fertile females and 1,236 larvae by direct development. In this contrast, attributable possibly to the influence of the hosts, may be found the explanation of heterogony.

R. T. L.

ROSE (F. G.). **Report of the Government Bacteriologist, British Guiana, to the Tropical Diseases Research Fund Committee for the Period January, 1919, to March, 1920.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 1–15. (Discussion pp. 16–17.)

This important contribution deals chiefly with filarial diseases. Tables are given which show that infection with *Filaria bancrofti* is widespread in the county of Demerara, and especially in the city of Georgetown and its vicinity; that it attacks all races, but particularly the Portuguese. The clinical manifestations are found in greater proportion in the female than in the male, and appear to attain their maximum incidence in young adult life between the ages of 21 and 30. An investigation to determine the local mosquito carriers showed that of 1,500 female mosquitoes (of which 237 were *Stegomyia fasciata*, 105 *Cellia argyrotarsis*, 27 *Mansonia titillans*, and 1,131 *Culex fatigans*) all the infected mosquitoes (save one *Stegomyia fasciata*) belonged to the species *C. fatigans*. Infection occurred in approximately 7·4 per cent. of these. The "filarial" lymphatic gland is either varicose or the seat of solid enlargement. From the acutely enlarged gland a pure culture of streptococcus can be obtained in 90 per cent. of cases. The characteristics of the gland which has been the seat of recurrent inflammatory attacks are the marked reduction of the cellular content of the follicles and the generalized fibrosis.

From a detailed study of the Arneth index the author concludes that this is unaffected in a simple infection with *Microfilaria bancrofti*. When clinical symptoms occur it almost invariably shows a shift to the left. This shift also occurs in cases of filarial oedema and elephantiasis when not of long standing, and bears a relation to the severity and duration of attacks. These results are consistent with the assumption that pathological symptoms in these cases of filarial infection are invariably due to the influence of pathogenic bacteria and obviously supply a useful guide in prognosis and treatment. The coexistence of filarial infection with a high index points to the probability of an early onset of symptoms and is an indication of the advisability of prophylactic inoculation.

A study of the differential leucocyte count in a series of male and female patients was made. While the former showed none the latter showed a slight increase of eosinophiles which may be due to other causes. In clinical filariasis a relative increase in the polymorphonuclear cells is the first result of the onset of an attack. Favourable progress is accompanied by a relative increase in the lymphocytes. A relative increase in the neutrophils is found in the abscess-formation, in all cases at or before the climax of an attack, and in severe cases for some days after subsidence.

The paper concludes with an account of mass-experiments to test the efficacy of vaccine therapy and prophylactic inoculation in inflammatory conditions associated with infection with *F. bancrofti*. The author shows that prophylactic inoculation has a markedly beneficial effect in reducing the frequency and severity of attacks in the majority of cases, but in cases of long-standing chronic lymphangitis and lymphadenitis inoculation appears to have little or no effect.

R. T. L.

FLU (P. C.). **Beschouwingen naar aanleiding van een onderzoek over de verbreiding van *Filaria bancrofti* onder de inlandsche bevolking van Weltevreden.** [Remarks induced by an Investigation on the Spread of *Filaria bancrofti* among the Native Population of Weltevreden.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 3. pp. 317–339.

The author examined for microfilariae thick films of 1,112 male native inhabitants of Weltevreden, partly (896) settled people, partly (216) coolies living there less than one year. The former group showed infection in 10·1 per cent., the latter only in 2·3 per cent. The microfilaria found was that of *Filaria bancrofti*. The filariasis rate at Weltevreden (average 8·5 per cent.) is about the same as in the surrounding countries and far lower than the percentages in Africa and parts of tropical America.

The author thinks that the degree of infection with filaria in a population is greatly dependent on its habits. The more settled a population the higher the chances of infection and reinfection, resulting in evident filariasis. In the Dutch East Indies, *e.g.*, Atchin and Djambi in Sumatra, with a settled population, show higher figures (Djambi 23·7 per cent.). The way in which the natives store their drinking water (whether they gather rain water in special vessels or take their drinking water from rivers, etc.) may have a great influence on the breeding chances of the transmitting mosquito. The natives of Weltevreden do not store rain water, and therefore the villages do not offer so many breeding places to *Culex fatigans* and *Stegomyia scutellaris*, the principal carriers there. (Anopheles species could be experimentally infected, but many of the larvae do not develop in the body of these mosquitoes.) In every locality the habits of the population should be properly studied in relation to the spread of filariasis in order to obtain a better knowledge of the epidemiology of this disease.

W. J. Bais.

JEANSELME (E.), SCHULMANN (E.) & POMARET (M.). **Chylurie filarienne. Le rythme d'élimination des urines et leur constitution chimique.** —*Presse Méd.* 1920. May 12. No. 30. pp. 293–295. With 3 charts in text.

Two cases of filarial chyluria are recorded, with full clinical details. In spite of much research, the disease still presents certain obscure points. The author questions whether the primary factor is the position of the lymphatic pockets, or whether the microfilaria play the more important part. Generally speaking, filarial chyluria does not present any immediate danger.

R. T. L.

i. CONNAL (A.). **Observations on Filaria in Chrysops from West Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Feb. 18. Vol. 14. No. 6. pp. 108–109. (Discussion, p 109.)

ii. —— & CONNAL (S. L. M.). **A Preliminary Note on the Development of *Loa loa* (Guyot) in *Chrysops silacea* (Austen).**—*Ibid.* Oct. 20. Vol. 15. No. 4. pp. 131–134.

i. Of 2,255 specimens of Chrysops collected near Sapele in Southern Nigeria 0·9 per cent. were found to be infected naturally with filaria. The largest number of flies was collected during the wettest months, *i.e.*, from May to July. Of the total, 2,006 belonged to the species *C. silacea* and the remainder, 249, belonged to *C. dimidiata*. Sixteen of the former and six of the latter were found to have a filaria infestation which was always heavy, and in one insect 427 worms were counted. *Filaria loa* is endemic in Sapele.

ii. With 608 specimens of *C. silacea* and *C. dimidiata* caught at Sapele the authors conducted 20 feeding experiments on cases of *F. loa* infection. From a part of the material already examined, it is found that within 24 hours of the infecting feed the majority of the embryos have reached the abdominal muscles, where they come to rest. Others have proceeded to the head and thorax. Growth is rapid, and up to the third or fourth day they are cigar-shaped. By the fifth and sixth day elongated forms are seen coiled in whorls in the musculature, especially of the abdomen. The final stage of development is reached within from 10 to 12 days, after which the larvae migrate towards the head, accumulating at the root of the proboscis and in the labium. They gain exit by the labella. Of 225 controls examined eight were found to be naturally infected, *i.e.*, 3·5 per cent. Evidence of double infection occurred in the experimentally infected flies.

R. T. L.

BAUMANN (Max). **Ueber einen Fall von** *Filaria loa*. [A Case of *Filaria loa* Infection.]—*Muench. Med. Woch.* 1921. Sept. 2. Vol. 68. No. 35. p. 1118.

The author describes a case in which he removed a male *Filaria loa* 8 cm. long, from the eyelid. In 1912, after a year's stay in the Cameroons, the patient noticed a swelling in his arm; this wandered to his hand, shoulder and leg, so that he was never without swelling for more than a month at a time. This so-called "tropical swelling," which was the size of a hen's egg, gave little trouble beyond causing a slight irritation and tenseness. After a stay of 15 months in Spain in 1916 the worm seemed to have disappeared and was believed to have become encapsuled. In 1921, 14 days before coming to the hospital, the patient noticed the worm once more in his leg, and three days before entry he saw its "head" raised beneath the skin. The worms are supposed to wander over the body until sexually mature and then, after death, to become calcified. This case is interesting because of the long duration of nine years, the usual time from the first symptoms until the appearance in the eyelids being about 14 months. The longest case previously recorded is six years.

R. T. L.

LOW (George C.) & O'DRISCOLL (Elizabeth J.). **Observations upon a Case of** *Filaria* (*Loa*) *loa* **Infection.**—*Lancet.* 1921. Apr. 16. pp. 798–800. With 3 charts in text.

With a résumé of the characteristics of Loa infection and clinical notes of a case the authors give an interesting chart showing that during a period of six days in which the patient slept during the day and thus inverted his normal habits, there was no change in a marked diurnal periodicity of appearance of the filaria embryos in the peripheral blood. Injections of tartar emetic in dosage totalling 25 gr. failed to eliminate the embryos either of *F. loa* or *F. perstans* from the blood stream.

R. T. L.

BEGLE (Howell L.). **Infestation with *Filaria loa*: Report of a Case of Filaria beneath the Conjunctiva and Microfilariae in the Peripheral Blood Stream.**—*Jl. Amer. Med. Assoc.* 1921. May 7. Vol. 76. No. 19. pp. 1301–1302.

This is a report of a case of *Filaria loa* in a patient who had spent the years between 1906 and 1909 in Southern Nigeria. An adult worm was removed from his right eyelid in 1918. Although three years have since elapsed and no other adult parasites have made their appearance, microfilaria are found in the day blood whenever this is examined. It is apparent that the infestation is of from 12 to 15 years' duration.

R. T. L.

MÜHLENS (P.). **Zur Behandlung der Filariasis.** [Treatment of Filariasis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 247–248.

In two cases of *Filarialoa* infection with numerous microfilariae in the blood, the author tried the curative effect of picric acid. The patients were each given about 14 gm. of picric acid over a period of two months given in daily doses of 0·25 gm. in wafers for several consecutive days, this was repeated for three days after an interval. Later, two daily doses of 0·25 gm. were tried; usually the drug was well borne. At first one of the patients complained of lumbar pain and the other showed slight albuminuria. Severe jaundice was noticeable. In one case a positive result seemed to follow, for no filariae were seen for 14 days, but they then reappeared. The number of microfilariae was lessened from time to time but there was no marked diminution. In 1919 a case of *Filaria bancrofti* from Samoa was treated for amoebic dysentery with neosalvarsan, simaruba and emetine. Microfilaria and the clinical signs of filariasis showed a notable disappearance, but this may have been an accidental circumstance, for in other cases no result was obtained with neosalvarsan or antimony. In 1913 a case was apparently cured with Arsalyt, but this also may have been a coincidence. No sure method has yet been found.

R. T. L.

SERGENT (Étienne) & GOUILLON (Paul). **Essais d'inoculation à un singe d'une filariose humaine par des piqûres de** *Culex pipiens.*—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 85.

This note records an unsuccessful attempt to infect *Culex pipiens* and thence *Macacus sinicus* with *Filaria perstans.* No evidence of infection of either mosquito or monkey was obtained.

R. T. L.

GUPTA (H. Das). **A Case of Filarial Cyst on the Eye.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. p. 338.

A small cystic tumour near the outer canthus was found in a Mahommedan male, age 25, who came to the out-patients' clinic at Ramporehaut complaining of severe pain in his right eye and in the surrounding parts. This had commenced a fortnight previously as a tingling sensation accompanied by frontal headache which gradually increased. The cyst was opened under a local anaesthetic and two fine white threadlike living worms measuring 1½ in. were found moving in the gelatinous contents and coiled up together.

R. T. L.

HONDA (I.). **On the Pathological Changes of the Dog's Kidney caused by the Embryos of** *Filaria immitis* **and One Case of those in the Human Kidney caused by the Embryos of** *Filaria bancrofti*.—*Kyoto Igaku Zassi.* 1921. May. Vol. 18. No. 4. [English Summary, pp. 40–41. In Japanese pp. 28–44.]

The conclusions as summarized from the Japanese text by the author are:—

1. The embryos of *Filaria immitis* sometimes cause parasitogenetic interstitial nephritis.
2. The embryos of *F. immitis* sometimes cause pseudotubercles in the tissues of the dog's kidney.
3. The bodies of the embryos of *F. immitis* contain some toxin causing necrosis of the granulation tissue produced by the embryos.
4. This toxin is perhaps endogenous.
5. When the embryos show their pathological agency they disappear at a comparatively early age.
6. The embryos sometimes cause infarcts in the kidney of the dog.
7. The author, in one human case infected with *F. bancrofti* has observed infarcts, increase of the interstitium, atrophy of the glomeruli and distension of the lymphatic channels and of the blood vessels, etc. Comparing these results with those seen in the dog's kidney caused by *F. immitis* the author suggests that the embryos of *Filaria bancrofti* may play a similar rôle.

R. T. L.

KAWAKAMI (Zen) & KITAGAWA (M.). **On the Study of Elephantoid Skin of a Dog.**—*Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. 3. pp. 1–6.

In a female dog seven years old there was a hairless area over the greater part of the back and the sides of the chest. The skin appeared like tanned leather, and somewhat thick with slight desquamating epidermis, without any exanthema. There was no growth of hair in this area at certain seasons and the area was gradually widening. Numerous larvae of *Filaria immitis* occurred in the blood. A study of sections leads the authors to conclude that the filarial larvae, while circulating in the blood, attempt to leave the host through the skin and pass through the walls of the vessels into the perivascular tissues, or come to a standstill in the vessels and cause the collections of cellular masses around them in which they die and are absorbed. The larvae found in the epidermis, hair follicles and in the sebaceous glands are those which escaped being engulfed in cellular masses. The authors believe that the elephantoid disease in the dog was caused by the invasion of many larvae of *Filaria immitis* in the limited area, but why a certain part of the skin was selected and why so many larvae were found therein they are unable to explain.

R. T. L.

RODHAIN (J.). **Observations diverses concernant** *Onchocerca volvulus*.—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 848–858.

These observations are grouped under four headings:—(1) The general distribution of human onchocerciasis in the Belgian portion of the Congo basin. Tumours of *O. volvulus* occur very generally among the dwellers along the main river and its principal tributaries; all districts, however, do not show equal intensity of infection. (2) Local reactionary phenomena induced by the tumours of *O. volvulus*.—The majority showed no acute inflammation; in others the tumours were filled with pus mixed with blood. Suppuration is usually limited to the interior of the tumour, the latter in some instances being partly destroyed, with more or less complete liberation of the parasites. In one case, described in detail, 26 nodules were found, without any accompanying filarial itch. In another case—a child bearing a cyst on the occiput—there occurred in addition some slight swelling of the face, puffiness of the features and dryness of the hair, which entirely disappeared when the cyst was removed. This seemed to show that the cyst was the cause of skin troubles of the head and face. (3) Localization and histology of filarial tumours. In the majority of cases the tumours did not adhere to the skin; in others there was undoubted adhesion. In only one instance did the author see a possible invasion of a lymphatic gland. (4) A case of filarial tumour in a European in whom a cyst was present on the left shoulder yielded *O. volvulus*; blood examination gave *Microfilaria perstans*. Apart from the tumour there was no additional cutaneous manifestation.

R. T. L.

MONTPELLIER (J.) & LACROIX (A.). **Le Craw-Craw ou gale filarienne; son origine dans les kystes sous-cutanés à** *Onchocerca volvulus*. —*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 305–315. With 1 plate.

Among native troops from Africa a number showed a skin infection, or itch, occurring especially on the buttocks, sides, and lumbar region. With this were frequently associated inguinal, especially crural, swellings and eosinophilia, varying from 5 to 40 per cent. Systematic examination resulted in the discovery of the constant presence of microfilariae in the dermal layer of the skin, independent of the vascular network. These were considered to be the embryos of *Filaria volvulus*, or a very nearly allied species. The affection was regarded as identical with craw-craw as described by O'NEIL in 1875.

Further investigations showed the occurrence in some patients of fibrous cysts, one of which upon dissection yielded a male and part of a female *Onchocerca volvulus*. Filarial itch is therefore considered to be a dermal manifestation of onchocerciasis.

Professor BRUMPT, in a discussion at the conclusion of the paper, affirmed that it was impossible, in view of the distribution of craw-craw and volvulosis, to regard as justifiable the relations which the authors claim to have established between the microfilariae studied and the tumours due to *O. volvulus*.

R. T. L.

MONTPELLIER (J.), DEGOUILLON & LACROIX (A.). **La gale filarienne est-elle bien une manifestation de volvulose?**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 530–535.

The authors uphold their previous statements regarding the nature of filarial itch. So far as their researches have gone, filarial itch, or craw-craw, using the term in the original restricted meaning of O'NEIL, corresponds in its geographical distribution with *O. volvulus*. Except in rare instances, all the patients under observation showed fibrous tumours of Onchocerca, and, further, no single carrier of these tumours was without the eruption characteristic of filarial itch.*

R. T. L.

MONTPELLIER (J.) & LACROIX (A.). **Sur une nouvelle dermatose d'origine filarienne observée sur les contingents noirs (gale filarienne).**—*Presse Méd.* 1920. Sept. 1. Vol. 28. No. 62. pp. 607–609.

This paper gives a general account of the contents of the two preceding papers.

R. T. L.

BRUMPT (E.). **Au sujet des rapports entre l'***Onchocerca volvulus* **et la gale filarienne.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol 13. No. 7. pp. 535–539.

To justify the assertion that filarial itch is a manifestation of onchocerciasis it is necessary (1) to show that all persons affected by the itch possess adult *Onchocerca volvulus*, and (2) that all carriers of tumours of *O. volvulus* show the skin eruption. It is extremely difficult to demonstrate *O. volvulus* tumours which are not cutaneously placed. The author has never been able to find microfilariae in the liquid drawn from pustules of craw-craw or "pseudo-itch." In 1902 he observed 18 cases of "pseudo-itch" without visible tumours, and seven cases of onchocerciasis without skin lesions, among canoe-men at Ouellé. On the other hand, in onchocerciasis of Guatemala, the skin lesions were always observed near the tumours [see this *Bulletin*, Vol 14, p. 157]. The whole collection of biological facts makes the author doubtful of the rôle of *O. volvulus* in the causation of filarial itch.

R. T. L.

MONTPELLIER (J.), LACROIX (A.) & BOUTIN (P.). **Note hématologique concernant les sujets infestés par** *Onchocerca volvulus*.—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 653–654.

The authors systematically examined the blood of a great number of natives infected with *Onchocerca volvulus*; some were examined whilst suffering from an eruption caused by the parasites, and others during an intervening period; examinations were made both day and night. The authors never found *Microfilaria volvulus* in blood films taken from the patients. The globular resistance was variable, ranging from 54–36. The haemolytic index was about normal, 3–5. Enumeration of the red blood corpuscles showed slight anaemia in a certain number of cases. The number of leucocytes was always normal, 6–8,000. But the leucocyte count was very variable; the percentage of polynuclear neutrophiles ranged from 28 to 70, of eosinophiles from 0 to 70, of large mononuclears from 8 to 40, of lymphocytes from

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* **A further paper on this subject was summarized in this** ***Bulletin*****, Vol. 19, 172, under Tropical Dermatology.**

2 to 50. The authors are unable to explain this great variability, which seems to follow no laws. However, the maximum eosinophilia seems to occur at each discharge of microfilariae into the blood; that is, at the beginning of each skin eruption; and the minimum to coincide with each period of microbic infection due to scratching, *i.e.*, towards the end of each eruption. Finally, the authors examined more than 30 carriers of Onchocerca for "l'image éosinophilé" of SABRAZES, and found a constant high eosinophile index of 230-276. In interpreting these results it must be remembered that the loss of leucocytic equilibrium may have been due in some of these cases to other causes.

R. T. L.

OUZILLEAU, LAIGRET & LEFROU. **Contribution à l'étude de l'*Onchocerca volvulus*.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 717-728.

The authors describe a region along the right bank of the Congo, where disease from infection with *Onchocerca volvulus* is very common. In the village of Djoué, near Brazzaville, 16 out of the 27 inhabitants were attacked; five had cutaneous lesions in addition to cysts, and one had keratitis. The clinical details of three cases may be summarized as follows:—

1. Puncture of the cysts gave 13 positive results out of 15. Puncture of lymphatic glands gave 8 positive results out of 15. Puncture of cysts and lymphatic glands gave negative results in one case, Onchocerca disease being diagnosed by the presence of *Microfilaria volvulus* in the skin.

2. *Microfilaria volvulus* was never found in the blood; *Microfilaria perstans* occurred in 5 of the 15 cases.

3. Clinically, in addition to cysts, elephantiasis and ocular lesions, the following macroscopic lesions were noted:—pseudo-icthyosis, Icthyosis simplex and lichenization.

Histo-pathological lesions.—There is an infiltration of connective tissue and mononuclear cells in the dermis, and *Microfilaria volvulus* are always found in it. In the places where pigment is lacking, a dense connective tissue is found which contains neither vessels, glands nor microfilaria. In the epidermis general hyperkeratosis is noticed, often with infiltration of the stratum germinativum and stratum filamentosum with leucocytes. In the lichenosed zones enlarged dome-like papillae are found; in the regions of prurigo similar lesions are found, as described above, with blisters, in addition, which completely destroy the epidermis. In the leucodermic areas there is complete absence of pigment, and the horny layers are much thinner than usual. In the cysts, microfilariae are found only rarely. In the elephantiasis lesions parakeratosis exists, papillary vessels are very dilated, microfilariae swarm in the dermis and spread into the hypodermis. Sebaceous glands are very rare, and sudoriporous glands are entirely absent.

From these clinical and histo-pathological facts the authors draw the following conclusions:—(1) Subjects infected with *O. volvulus* always have *Microfilaria volvulus* in the dermis. (2) In the authors' opinion "craw-craw" is not connected with Onchocerca disease. (3) They state tentatively that the cutaneous lesions are not caused through pruritus, but that the *Microfilaria volvulus* creates inflammatory reactions in the skin, which manifest themselves by pseudo-icthyosis, elephantiasis of the genitalia and other parts, by achromy and cutaneous atrophy.

R. T. L.

STILES (C. W.). **A Probable (Third) Case of** *Gongylonema hominis* **Infection in Man.**—*Public Health Rep.* 1921. May 27. Vol. 36. No. 21. pp. 1177-1178.

Two cases of human infection with the Nematode *Gongylonema* are on record. In both instances the parasite was removed from the lower lip. The following details are given concerning a third case, found in Georgia, U.S.A. Unfortunately the specimen is macerated; "much of the cuticle is destroyed, but by good fortune a fragment of the cuticle showed two of the 'bosses' which characterize the anterior end of Gongylonema; further, the pharynx excludes *Loa* from consideration." In order to avoid "erroneous deductions as to life history," the author suggests, on purely empirical grounds, that this worm and that described by WARD [this *Bulletin,* Vol. 8, p. 205] as possibly identical with *G. pulchrum* be referred to as *G. hominis* sp. dub.

"The patient, a woman about 50 years of age, came to my office complaining with sore throat. She gave a history of having had this trouble for about three weeks, and having had treatment from a throat specialist for a supposed pharyngitis. Upon examination I found an abrasion of the mucous membrane around the anterior pillar of the tonsil; this abrasion seemed to be healing, but near the angle of the jaw there was another abrasion which presented a rather pronounced hyperemic condition. This area was very sensitive to touch, and patient complained of tickling, pricking sensation at times. The areas were touched with a 10 per cent. silver nitrate solution and patient was given a mild antiseptic mouth wash; a purge of calomel was also given. About three days later she returned and complained of a soreness on other side of throat. An examination showed another abrasion similar to the previous ones but on the opposite side of mouth and about one inch anterior to the angle of the jaw. This time it was again touched up with silver nitrate and patient given a mouth wash containing a very strong solution of thymol. The next day she came back to office with the worm. She stated that she felt something like a thread with her tongue, and taking a mirror she was able to grasp the worm with the fingers and pull it out. At this time the worm was very active, and lived, after being placed in a vial of water, for several hours, perhaps longer."

R. T. L.

FAURÉ. **A propos de trois cas de ver de Guinée.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. (Numéro exceptionnel). pp. 79-86.

Between October, 1914, and July, 1915, a number of cases of guinea-worm among Colonial troops were treated at the Ambulance Coloniale de Saint-Louis. Three cases, which are described in detail, proved especially interesting, two on account of the exceptional location, the third because of the abundance of the parasites. In the first patient tumours occurred in the right iliac region, immediately above the crural arch, and in the right thigh, at the level of the triangle of Scarpa; in the second case, in various situations in both legs, one of which was painlessly swollen throughout.

R. T. L.

KONDO (Kiichi). **[Experiments on the Infection of** *Ascaris lumbricoides.*]
i. **[Percutaneous Infection.]**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. June 12. No. 2181. pp. 1123-5. Also: *Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. July 31. No. 211. pp. 630-3. [English summary p. 5.]
ii. **[Infection through Mouth.]** *Tokyo Iji Shinshi.* 1920. July 24. No. 2187. pp. 1407-11.

i. The young of *Ascaris lumbricoides* formed inside the egg-shell has never been known to hatch out of the shell when kept outside the body of a host. The author treated faeces which contained Ascaris eggs with animal charcoal and put it out of doors, protecting from the direct sunshine and from becoming dry. In the course of two weeks the eggs began to segment, and after seven weeks young were found moving slowly inside the egg-shell. Still some days later, viz., about 70 days after the commencement of the culture, the young, measuring 0·2-0·25 mm. were found hatched out and moving very actively. These young could live in wet soil for more than a month.

If smeared on the skin of young guinea-pigs, such artificially hatched young successfully attacked the host, some of them being found both in the lung and liver.

ii. These young Ascaris artificially hatched were subjected to various digesting media to see how long they can withstand these. In the artificial stomachal juice, prepared in two different ways, the young could live for 2-9 hours. In both the human stomachal juice and artificial intestinal juice, they were found alive as long as six hours. Further, it was proved that if such artificially hatched young of Ascaris were eaten by rats they can develop within the lung and liver.

Hiroshi Ohshima.

KONDO (Y.). **Infection with Ascaris Larvae through the Mouth.**—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. Sept. 30. No. 212. [In Japanese: English summary p. 2.]

Ascaris larvae were obtained from mature eggs and fed to rats. Live larvae were found in the stomach and intestine five hours afterwards. The larvae also remain alive in natural human gastric juice, as well as in artificial preparations, for three or four hours. It is therefore established that infection with Ascaris through the mouth may occur by ingestion of larvae as well as of eggs with food.

R. T. L

STEWART (F. H.). **On the Life History of** *Ascaris lumbricoides,* **L. Part V.**—*Parasitology.* 1921. Mar. Vol. 13. No. 1. pp. 37-47. With 8 text figs.

The results of new experiments are recorded. These were designed to ascertain (*a*) whether after the administration of ripe eggs of *A. suilla* to pigs the resulting worms could live and develop in the intestine beyond the 14th day, to which the author had previously traced them experimentally. They were found up to the 19th day. (*b*) To observe if larvae of *A. suilla* passed in the faeces of mice could infect pigs. These experiments failed, probably owing to technical difficulties.

The anatomy of the larval *Ascaris suilla* found on the 19th day and the development of the cuticle and lateral membranes, of the oesophagus and excretory cell are described and figured. The paper concludes with a discussion of the route taken by the larvac of *A. suilla* in their migration through the tissues of the host. The great frequency of the larvae in dilated blood capillaries, venules and veins of the liver supports the author's original contention that the path of invasion followed by the great majority of the larvae is by the blood-stream and that they are guided by thigmotropism. Pigs over two months old are little susceptible to infection.

R. T. L.

RANSOM (B. H.) & CRAM (E. B.). **The Course of Migration of Ascaris Larvae.**—*Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 129–156. With 5 text figs. and 2 plates.

Experiments and observations made by the authors clearly demonstrate, in opposition to the conclusions of YOSHIDA, that the passage of the larvae of ascaris is in the portal vein to the liver, thence by the hepatic veins and vena cava to the right side of the heart, from which they reach the lungs by the pulmonary arteries. Many newly hatched larvae also pass from the intestine to the mesenteric lymph nodes and so may reach the heart without traversing the portal circulation. Larvae are commonly present in the peripheral lymph nodes, spleen, kidney, and other viscera, presumably from the systemic circulation. The authors are unable to confirm YOSHIDA in his view that the larvae piercing the intestinal wall enter the abdominal cavity or pass thence through the diaphragm into the pleural cavity. In vitro ascaris larvae under 800 μ in length die in artificial gastric juice at 35°C. within three hours, while those of 1 mm. or longer isolated from the lungs of infected animals commonly survive this period.

[A beautiful series of microphotographs illustrate the paper.]

R. T. L.

FÜLLEBORN. **Ueber die Wanderung von Askaris- und anderen Nematodenlarven im Körper und intrauterine Askarisinfektion.** [The Migration of Ascaris and other Nematode Larvae in the Body, Intrauterine Ascaris Infection.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 146–149. With 1 text fig.

Experiments demonstrate that *Ascaris lumbricoides* larvae pass from the intestine *via* the hepatic portals to the liver and thence by the hepatic veins to the lungs. The author has also shown that ascaris larvae pass to the kidneys by the blood stream, not by boring into the organ from the surface. Further experiments prove that the larvae pass from the arteries to the veins not only by boring their way through the capillary walls but also by passing along the channels of the capillaries. In Strongyloides, at least, the typical haemorrhages in the lungs are caused by the borings of the larvae, for if dead larvae are introduced these do not occur in any noticeable quantity. By the blood stream ascaris larvae should eventually reach the placenta—a supposition which has proved correct, for the finding of 2–3 week old Belascaris in dogs 4–5 days old is reported. The larvae for these experiments were procured by chopping up an organ containing larvae. This mince is placed on very fine tightly drawn gauze and left in saline solution at body temperature for several hours—the larvae bore through the gauze and fall into the vessel underneath—any detritus attached to them can be got rid of by adding the filtered intestinal juice of a dog, which digests the detritus without harming the larvae.

R. T. L.

FÜLLEBORN (F.). **Askarisinfektion durch Verzehren eingekapselter Larven und ueber gelungene intrauterine Askarisinfektion.** [Ascaris Infection through Ingestion of Encapsulated larvae. Intrauterine Ascaris Infection.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 367–375. With 3 text figs.

The author carried out experiments to show that Belascaris in dogs does not need an intermediate host for development. He injected thousands of Belascaris larvae under the skin of a pregnant bitch; 13 days afterwards the puppies were born. Whereas in most newborn dogs only a few Belascaris are found, in each of these over 100 were present. The author has also been able to prove that the small cysts (0·3—0·5 mm.) which occur in the liver, kidney and muscles, etc., of dogs are due to Belascaris—each contains one or two small worms; the encapsuled larvae can remain alive for many months. If material containing such cysts is fed to guinea-pigs and mice the animals develop similar cysts, which shows that the capsules become digested and the free larva behaves exactly as if it had just escaped from its egg; also a dog may become infected in the same way. It is also possible that if man ingests Belascaris eggs similar cysts may develop in his organs. The pathological importance of these cysts is not yet known.

R. T. L.

FÜLLEBORN (Friedrich). **Ueber Askaridenlarven im Gehirn.** [Ascaris Larvae in the Brain].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 62–63.

Having previously found ascaris larvae in the kidney the author believed that they reached this organ *via* the blood stream, and he concluded that if they travel from the lung by the blood stream then they should be found also in the brain. A few days after experimental feeding with ripe eggs, ascaris larvae were found by him in the brain. The larvae do not affect the brain in any way, even when many thousands are injected directly into the carotid artery. Since only solitary larvae remained in the brain a week after feeding the author believes that the greater number return to the lung in the blood stream. As was to be expected larvae were found in all organs which receive an abundant blood supply, *e.g.*, heart muscle. The author draws the conclusion that in human beings ascaris larvae which have passed from the lung by the blood stream to the brain and other organs are probably harmless. He remarks on the numerous worm patches on the lungs of his experimental dogs, which to the naked eye look just like tubercle, and questions whether this appearance may not also occur in man.

R. T. L.

PENTLAND (Charles). **The *Ascaris lumbricoides* as the Cause of Urgent Symptoms in Diseases amongst Children.**—*Practitioner.* 1920. April. Vol. 104. No. 4. (No. 622.) pp. 313–315.

The writer gives details of several cases with high temperatures, acute pain and symptoms sometimes closely simulating an attack of peritonitis or appendicitis in its early stage, all of whom passed worms after treatment with a diaphoretic mixture and santonin and hydrarg. c. cret. After this treatment the temperature dropped, the pains disappeared, and the patients recovered completely. In one case, in addition to the other symptoms, a distinct degree of jaundice was present; this case had passed worms frequently a month before this actual attack; santonin and hydrarg. subchlor. were prescribed, and two days later a large roundworm was evacuated. The calomel (1 gr.) was continued for six days; the jaundice rapidly cleared up; three small worms were passed. About the twelfth day the patient had completely recovered. The author is of opinion that the worm must have obstructed the common bile duct, thus causing the temporary jaundice.

R. T. L.

BOURGES (Henry). **Troubles nerveux dans deux cas de lombricose intestinale. Rôle pathogène des toxines ascaridiennes.**—*Arch. Méd. et Pharm. Nav.* 1921. July–Aug. Vol. 111. No. 4. pp. 312–318.

Two cases of severe intestinal infection with Ascaris in children, accompanied by acute nervous troubles, are described, with special reference to the question of the production of toxic substances by the parasites.

The author, summarizing the work and conclusions of a number of investigators, concludes that the ascarids give rise to toxins which are absorbed by the intestine; the toxins gradually produce an effect on the organism, and under the influence of some liberating cause of which we know nothing, anaphylactic symptoms suddenly appear. The nervous manifestations observed are the clinical expression of this liberation.

R. T. L.

PALERMO (Pedro). **A ascaridose.**—*Brazil Medico.* 1921. April 9. Year 35. Vol. 1. No. 15. pp. 180–183.

The author enlarges on the protean character of the semeiology of ascariasis and cites cases in which diagnoses of epilepsy, meningitis, paratyphoid, and hepatic colic were falsified by the administration of a vermifuge, leading in each case to the expulsion of ascarids and the rapid disappearance of symptoms. The author states, quoting as his authority Dr. Joao Sette CAMARA, that a constant feature of ascariasis, and, indeed, of all intestinal verminoses, is a condition of hypertrophy and hyperaemia of the fungiform papillae of the tongue.

F. S. Arnold.

CROWELL (Bowman Corning). **The Dangers of Ascariasis.**—*Amer. Jl. Med. Sci.* 1920. Mar. Vol. 159. No. 3. (No. 576.) pp. 380–398. With 3 figs.

Ascaris lumbricoides has a wider geographical distribution in all climates and latitudes and infests a larger number of people than any other known intestinal parasite. The author quotes the following statistics from the Philippine Islands illustrating its incidence there. In 1911, 62·3 per cent. of 4,278 persons were infected with Ascaris as compared with 54·37 per cent. with hookworm; out of 19,302 examinations, 61·36 per cent. had Ascaris, 30·57 per cent. hookworms. In other places the incidence of the Ascaris runs up to almost 100 per cent. The pathological effects of Ascaris are:—(1) Mechanical; (2) as a carrier of infection during its migrations; (3) the larvae cause a broncho-pneumonia in experimental animals and may do so in some cases of infants; (4) the presence of a harmful toxic substance is a danger and causes reflex nervous symptoms.

The author deals with these effects in great detail.

R. T. L.

MÜSSIG (Richard). **Schwere Formen von Askaridiasis.** [Severe Forms of Ascariasis.]—*Muench. Med. Woch.* 1921. Oct. 28. Vol. 68. No. 43. pp. 1395–1396.

The author gives clinical details of three cases of severe ascariasis:

1. The patient, aged 49, suffered from her thirtieth year from frequent sudden abdominal pains and gall-stones. Recovery was complete after an operation, at which one gall-stone and one large Ascaris which was wedged in a wide bile duct were removed. It is impossible to state definitely that the Ascaris caused the cholelithiasis, although this is quite probable. Why ascarids, which normally live in the small intestine, should travel into the bile ducts is as yet unknown.

2. Patient No. 2, who was previously in good health, had a sudden attack of severe abdominal pains. At operation a conglomerate mass of 28 Ascaris was found in the ileum, causing obstruction.

3. Patient No. 3 entered the hospital suffering from what was diagnosed as influenza. On the third day Ascaris eggs were found in the faeces; on the fourth day one Ascaris was passed in the stools. After treatment with oil of chenopodium 21 Ascaris were passed. After removal of the parasites the patient recovered completely.

The author believes that the toxic effects produced by Ascaris are due not to one but to many pharmacologically active substances.

R. T. L.

NISHIDA (T.). **[Intraperitoneal Swelling Caused by Parasitic Worms.]**—*Tokyo Iji Shinshi (Tokyo Med. News).* 1920. Aug. 28. No. 2191. pp. 1614–1618.

A swelling of a size of 11·5 by 9 by 8 cm. and firmly adherent to the abdominal wall was formed at the lower part of the abdomen, on the right side, in a woman 49 years of age. It contained thick yellowish-green pus and numerous eggs measuring 0·04 to 0·07 mm. in diameter, and was formed by an *Ascaris lumbricoides* which had emerged from the intestine into the abdominal cavity. There are two possibilities as to the route of the worm:—(1) It might have come out through the intestinal wall when quite young and had attained the mature stage, or (2) the full-grown worm might have penetrated the intestinal wall. Although it is known that young Ascaris penetrate into the abdominal cavity through the healthy intestinal wall, it is highly improbable that they can grow to so great an extent after having got inside the abdominal cavity. As to the second possibility, which seems more probable than the first, there was found on the intestinal wall no perforation nor trace of perforation which would have served as an exit. It is also doubtful whether the adult worm can penetrate through the healthy intestinal wall, as the young do normally.

Hiroshi Ohshima.

HAKANSSON (E. G.). **Ascariasis and Appendicitis : Report of a Case.**—*U.S. Nav. Med. Bull.* 1920. July. Vol. 14. No. 3. pp. 394–395.

This is a case of severe ascaris infection in a young girl. An operation for appendicitis showed the presence of an enormous number of worms in the ileum, jejunum and appendix, the latter presenting an advanced stage of inflammation. Death occurred eight hours after the operation. More ascarids were found in the peritoneal cavity, between the liver and diaphragm, making a total of 224 worms recovered from the child.

R. T. L.

PILLAY (T. Maduramuthu). **Strange Migration of a Round Worm.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56. No. 3. p. 100.

After incision of a soft fluctuating swelling at the upper part of the scrotum in a boy seven years of age a disintegrating roundworm escaped, with about an ounce of thick, creamy foul-smelling pus. There was no subsequent discharge from the abscess, and the wound healed rapidly. The boy had been ailing for more than a fortnight with fever and pain in the abdomen, and the swelling first appeared ten days previous to operation. The course taken by the worm would appear to be similar to that of an oblique inguinal hernia.

R. T. L.

KONDÔ (Kiichi). **[A Case of** ***Ascaris lumbricoides*** **found Parasitic inside the Pleural Cavity.]**—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1920. Feb. 8. Nos. 206–7. pp. 116–117.

The patient was a male aboriginal of Formosa, 11 years of age. A sharp pain had been felt at the lower part of the right side of the chest. Ascaris eggs were found abundantly in pus obtained from the affected part. When operated upon, a dead female specimen of *Ascaris lumbricoides* was found inside the pleural cavity. There was no communication between this cavity and the liver.

The eggs of the same parasitic worm were also found in faeces abundantly, and later, as a result of the use of santonin, 51 individuals of Ascaris were obtained.

Hiroshi Ohshima.

VALLET. **Un cas de stenose du cardia due à la présence d'*****Ascaris lombricoides*** **dans la portion thoracique de l'oesophage fortement ectasiée.**—*Ann. de Méd. et de Pharm. Colon.* Paris.. 1920. (Numéro exceptionnel.) pp. 88–89.

The author cites a case of the presence of *Ascaris lumbricoides* partially occluding the distal end of the dilated oesophagus. By the use of Faucher's tube an Ascaris worm and about 100 grms. of caseous milk were expelled. The liquid was found to contain eggs of *A. lumbricoides*.

R. T. L.

SABRAZÈS (J.), PARCELIER (A.) & BONNIN (H.). **Lombricose du canal de Wirsung, pancréatite hémorrhagique.**—*C. R. Soc. Biol.* 1922. Jan. 21. Vol. 86. No. 3. pp. 149–151. With 2 text figs.

The authors describe the following case of haemorrhagic pancreatitis :—A man 31 years old, previously in good health, was suddenly seized with severe abdominal pains, hiccough and flatulence. The condition becoming serious, he was sent to hospital. The facies was not peritoneal, and the pulse was 60. Laparotomy revealed sero-sanguinary effusion in the serous membrane, blood infiltration of the viscera, especially the pancreas, and several patches of suspected fat necrosis. Death took place during the day. The autopsy showed the lesions of haemorrhagic pancreatitis.

On microscopical examination an Ascaris 1½–2 mm. thick was found obstructing the canal of Wirsung, stretching from a point 3 cm. from the ampulla of Vater to the tail end of the pancreas. The author thinks that the migration of the worm from the duodenum into the pancreatic canal was the prime cause of the pancreatitis.

R. T. L.

CHASTANG. **Cas mortels de lombricose.**—*Arch. Méd. et Pharm. Nav.* 1921. July–Aug. Vol. 111. No. 4. pp. 319–324.

Three fatal cases of Ascaris infection are described. Autopsy in the first undoubted case showed the intestine torn through in numerous places and ascarids issuing through the tears.

R. T. L.

STEINEGGER (Alfred). **Ein Fall von Ascarideníleus.**—*Schweitz. Med. Woch.* 1921. July 14. No. 28. pp. 654–655.

The author describes the following case of intestinal obstruction caused by a number of ascarids. A child aged six years had suffered from ascarids two years earlier and had been treated with santonin. No worms had been seen recently. At the end of October she fell suddenly ill with acute appendicitis, was operated on on November 1st, and left the hospital as cured. On December 7 she suddenly became ill with abdominal pains and frequent vomiting. On clinical examination an ileus was diagnosed, and an operation was performed. On opening the abdomen a much-distended convolution of the small intestine was immediately seen which proved to be filled with ascarids; surrounding this distended portion was an adhesion ½ cm. broad which almost completely obstructed the lumen of the intestine and at its further end was attached to the caecum. These adhesions were detached, a small slit made in the intestine, and the entangled mass of worms picked out—16 ♀ and ♂ ascarids in all. After the operation the patient recovered completely. The above case is interesting because an existing stenosis seems to have caused the ascarids to become entangled and so lead to the obstruction. The cause of the adhesions may have been the acute inflammatory disease of the intestines of the previous few weeks.

R. T. L.

STILES (C. W.). *Ascaris lumbricoides* **caught in the Eye of a Shoe-Button.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 22. Vol. 76. No. 4. p. 239.

A female *Ascaris lumbricoides* sent by Dr. F. K. Travers Warrick, of Richmond, Va., to the author, in 1910, is threaded through the eye of a large shoe-button and is securely fastened about one-third of its length from the head. Other similar cases are quoted from earlier literature.

R. T. L.

CIUREA (J.). **Sur la source d'infestation par l'Eustrongle géant** (*Eustrongylus gigas* **Rud.**).—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 532–534. With 1 text fig.

During some feeding experiments on dogs with different species of fish from the Danube, in order to obtain infection with Opisthorchids, one, fed on *Idus idus*, showed at death a living female *Eustrongylus gigas*, Rud., entangled in the coils of the intestine. Since this Nematode frequently occurs in fish-eating animals, fish can be considered as having been the source of infection in the dog. Infection with allied species is similarly acquired in fish-eating birds. The larvae, which are described and figured, were found in the muscles of *I. idus*.

R. T. L.

POPOWSKI (N.). **Ueber den Blutbefund in den Fäzes bei Trichozephalus dispar und anderen Darmschmarotzern.** [Detection of Blood in Faeces in Infestation with *Trichocephalus dispar* and other Intestinal Parasites.]—*Muench. Med. Woch.* 1921. Nov. 11. Vol. 68. No. 45. p. 1455.

The author examined 890 cases for worms, making at the same time tests for blood in the faeces by the benzidine and phenolphthalein reactions. The cases comprised 292 men, 417 women and 181 children. In 515 cases (57 per cent.) worms were found—*Trichocephalus dispar* in 455 (51 per cent.), *Ascaris lumbricoides* in 20 (2·2 per cent.), *Bothriocephalus latus* in 6 (0·7 per cent.), *Taenia solium* in 6 (0·7 per cent.), *Oxyuris vermicularis* in 3 (0·3 per cent.), Ascaris and *T. dispar* in 18 (2 per cent.), *T. solium* and *T. dispar* in 4 (0·4 per cent.), *B. latus* and *T. dispar* in 2 (0·2 per cent.), Ascaris, *T. dispar* and *T. solium* in 1 (0·1 per cent.).

The blood tests were positive with *T. dispar* in 106 cases (23 per cent.), with *Ascaris lumbricoides* in 15 (75 per cent.), with *B. latus* in 2 (33 per cent.), with *T. solium* in 1 (17 per cent.), with *A. lumbricoides* and *T. dispar* in 7 (40 per cent.), with *B. latus* and *T. dispar* in 1 (50 per cent.). All the others gave negative blood tests. In the 375 cases in which no intestinal worms were found the blood test was positive in 54 (14 per cent.). By this it will be seen that a positive blood reaction is not a certain indication of the presence of Trichocephalus.

R. T. L.

MONTOYA (T. Wenceslao). **Tratamiento del "Tricocefalosis" por el jugo de higueron.** [Treatment of Trichocephaliasis by Ficus latex.]—*Repert. de Med. y Cirug.* Bogota. 1920. May Vol. 11. No. 8. pp. 432–445.

The author quotes MANSON as saying, after describing trichocephalus as inoffensive, " it is fortunate that this is so as no method of expelling it has been found." GUIART recommends thymol, and this is probably the least unsatisfactory of the vermifuges in current use against trichocephalus. It is to Colombia, states the author, that honour is due for the discovery of a true specific against trichocephaliasis in Ficus latex (*leche de higueron*).

The leche de higueron, now apparently largely used in Brazil and Colombia as a vermifuge, is a yellowish white liquid very like cow's milk in appearance. It readily ferments, frothing freely and giving off carbonic acid gas. In its natural state it is a perfect emulsion of rubber and resinous substances in a slightly sweet vegetable juice. It contains also an albumin and a substance of undefined composition readily yielding ammonia.

The author is of the opinion that the active principle resides in the ammoniacal substance. It has not, so far, been possible to isolate this. The following dosage table is given :—

Children from 12–18 months	15 gm.
" " 2–2½ years	20 "
" " 2½–5 "	25 "
" " 5–8 "	30 "
" " 8–15 "	35 "
Adults	40–45 "

The routine of treatment is:

The day before the drug is administered the patient is kept on milk diet after the first meal. A saline purge is given in the evening. Next day the whole dose is taken, fasting, in a little syrup or honey. Two hours after the dose a purgative dose of castor oil. Milk diets on this day also. In some cases a single dose brings about a complete cure; more often, however, it has to be repeated. Ordinarily the leche de higueron causes no toxic symptoms. Like other drastic purgatives, however, it may cause colic, nausea, and vomiting. Occasionally more serious symptoms present themselves, such as cramp, delirium, sudden and intolerable urticaria, syncope, vertigo, convulsions, rectal and vesical tenesmus, partial suppression of urine, etc. These symptoms generally disappear completely in a few hours.

F. S. Arnold.

DARLING (Samuel T.). **Observations on the Geographical and Ethnological Distribution of Hookworms.**—*Parasitology.* 1920. Sept. Vol. 12. No. 3. pp. 217–233.

The species of hookworm present in a particular race or district depends upon geographical, racial and climatic conditions. A people as a whole will only harbour the species whose embryos are present in the soil in the immediate environment. During migration these people will have carried their peculiar species into regions in which the endemic species is different. Thus, by a survey of the intestinal hookworms, the origin of a given people can be determined to a certain degree. Thus there has been a migration from India or Burmah into Java, Bali, Timor, Lombok and Madura. The primitive distribution of *A. duodenale* seems to have been limited to regions north of 20° N. lat.; that of Necator south of this line, as shown by the nearly pure cultures from natives of Africa and India. *A. duodenale* may have been carried to and from the Orient by the old trade routes.

A survey of existing tribes in India may disclose the presence of (*a*) a stock free from hookworms derived from Asiatic Transbehring ancestors; (*b*) a stock with both *A. duodenale* and *Necator* derived from Asiatic Trans-pacific ancestors; (*c*) a stock with pure *Necator* infection derived from Polynesian or Indonesian Trans-pacific ancestors.

R. T. L.

DIOGO (H. Cesar). **Prophylaxia da opilação em Cosmopolis e arredores.** [Prophylaxis of Ankylostomiasis in Cosmopolis and its Environs.]—*Serviço Sanit. Estado São Paulo.* 1920. N.S. No. 16. 43 pp. With 11 illustrations, 1 chart and 1 map.

An account of the work of the author's commission, appointed by the Serviço Sanitario of the State of S. Paulo (Brazil), to undertake a campaign against uncinariasis in the small inland town of Cosmopolis, and the surrounding district. The "dispensary method" was rejected in favour of domiciliary visiting. A staff of six clinical assistants mounted on mule or horseback, and each working in a defined zone, rode round the district collecting specimens of faeces for laboratory examination and personally administering the medicine to those requiring treatment. Lectures were discarded in favour of the method of domiciliary propaganda, which was found to work well. In talks, accompanied by practical demonstrations, instruction was given to the clinical assistants *re* transmission, prophylaxis, etc., to be passed on by them to the population. Those who proved least accessible to these methods were visited personally. In this manner every individual was visited, 96 per cent. of those requiring it received treatment, and latrines were established in every dwelling.

The author discusses the anthelminthic virtues of chenopodium. thymol and naphthol B., and expresses a preference for the last named,

F. S. Arnold.

HACKETT. **O problema da uncinariose.**—*Brazil Medico.* 1920. July 31. Vol. 34. No. 31. pp. 497–499.

The author states that even in S. Paulo microscopic examination showed that of 13,000 land workers 11,000, or 84 per cent., were infested by hookworms, although it is the most progressive State of Brazil, and cases of grave anaemia are not so numerous as in the north of Brazil, in the State of Rio, or on the Santa Catharina littoral. It appears that microscopic examination gives an error of about 15 per cent., for when the faeces of 500 of these were subjected to a worm count only one or two were found free from infestation, and these cases were members of the families of superintendents. The author is of opinion that 99 per cent. of the rural population of Brazil are infected. A worm count in children of five years of age gave an average of three worms ; at seven the average was 15 to 20, at nine 30 to 50. The author doubts the advantage of treating children below five years of age, unless their anaemia is grave, in view of the toxicity of chenopodium in the young. Again, persons of 50 and upwards rarely harbour many worms, and it is only among young adults that uncinariasis is a true scourge. Women at the age of 19 carry the largest number of parasites ; from then onwards the number diminishes progressively. This is the case also in Itatiaya, State of Rio, where arable and dairy farming are carried on concurrently, and in other places. Girls carry as many parasites as boys up to the age of 19. They then cease to accumulate them, and, in fact, begin spontaneously to rid themselves of them.

As regards treatment the author states that his observations entirely bear out the recommendations of DARLING. Microscopic examination of the faeces is, in the author's opinion, unreliable as a criterion of complete cure, its chief value being in the distinguishing of slight from severe infections.

F. S. Arnold.

MHASKAR (K. S.). **The Prevalence of Ankylostomiasis in the Madras Presidency. No. III. Hookworm Infection as a Predisposing Factor in Medical Diseases.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 395–397.

Investigations in Trichinopoly jail are tabulated to show the case-rate and death-rate from bowel complaints in the treated and untreated for hookworm, and it is clear that the average death-rate and the average period of illness from bowel complaints are lessened where there is freedom from hookworm. Similarly, a comparison of the case-rate and death-rate in the treated and untreated for hookworm during an epidemic of influenza shows that freedom from hookworm seems to diminish the susceptibility.

R. T. L.

MEGAW (J. W. D.). **Report on Hookworm Infection in the United Provinces.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp 840–863.

During investigations into the occurrence of hookworm in the United Provinces, an enquiry was made into the prevalence of the infection in jails and the large hospitals of Agra and Lucknow, with special reference to its relative frequency among dwellers in large cities as compared with those from rural districts. It was found that hookworm is extremely prevalent throughout the provinces, a higher percentage being observed among persons living in the country districts than among those in towns. The percentage of females attacked was found to be less than that of males. Among Hindus 88·04 per cent. harboured hookworms, among Mohammedans 60·38 per cent. The high rate of infection is considered to be the cause of serious economic loss to the Provinces by reason of the general decrease in the standard of health and the large number of cases of serious illness. It is urged that courses of instruction should be given to medical officers; lectures, newspaper articles, etc., to the people; dispensaries and necessary drugs should be provided, and experimental work, including preventive measures and treatment, be carried out in selected villages.

R. T. L.

DAKEYNE (D. I.); GRAHAM (J. D.). **Ankylostomiasis in Mesopotamia.** [MS. Report dated September 26, 1921. Received from the Colonial Office.]

Dr. D. I. Dakeyne, Civil Pathologist, Baghdad, reports that of 321 stools of Arabs examined at the New General Hospital, 33, or 10·3 per cent., contained ankylostome ova. He does not think that the proportion of infected Arabs in Baghdad would much exceed 10 per cent., but possibly infection is much heavier in irrigated areas. He investigated 18 cases of anaemia, most of which were severe and were definitely shown to be due to ankylostome infection.

Colonel J. D. Graham, I.M.S., Director of Health Services, points out that the population of Irak is in the main a scattered one, with, in certain areas, continuous migration "so that areas which are lived on could not become sodden with infection as would coolie lines with inadequate conservancy."

A. G. B.

MACCALLAN (A. F.). **The Ankylostomiasis Campaign in Egypt, 1913 to 1915.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1921. Oct. Vol. 14. No. 12. pp. 71–74.

After succinctly summarizing the steps which led to a series of surveys in the provinces of Sharqia and Assiût, the author gives the following opinion as regards the direction in which measures can most usefully be employed against ankylostomiasis in Egypt:—"There are three main lines along which investigation should be directed as a preliminary to any further campaign. First, a knowledge must be obtained of the habitat of the larvae which infect man by piercing his skin; secondly, a workable system of village sanitation must be evolved, which up to the present is entirely unknown; thirdly, further investigation of the nature and method of action of the ankylostoma toxin should be undertaken, not only with reference to the possibility of a reduction [? production] of a specific antibody, but as serving to explain many obscure phenomena in exceptional cases." The author's own feeling is that scientific investigation is required at the present time and that a crusade is unnecessary.

R. T. L.

SAWYER (W. A.). **Hookworm in Australia.**—*Med. Jl. Australia.* 1921. Feb. 19. 8th Year. No. 8. pp. 148–150.

It appears that hookworm infection in Australia is serious but not very widespread, being confined principally to irregular areas with fairly sharp boundaries which are chiefly determined by the amount of rainfall. Its control will depend principally on the prevention of soil pollution. There is an area of high prevalence throughout the region of high rainfall, extending from Cooktown to Ingham, between the coastal ranges and the sea. From Townsville to Bowen the rainfall and infection rate are low. Between Proserpine and Mackay the annual rainfall and infection are again high. Around Nambour and Landsborough we find another area of high rainfall and considerable infection. There is a similar area on both sides of the border between Queensland and New South Wales. It is expected that most of the interior of Queensland will be found to be free. In Papua the natives on the plantations are highly infected. The mines in Australia, so far examined, are uninfected, but the information about those located near heavily infected surface areas is scanty.

R. T. L.

MIYAGAWA (Yoneji). **Ueber den Wanderungsweg der** ***Ankylostoma duodenale*** **innerhalb des Wirtes bei Oralinfektion und ueber ihren Hauptinfektionsmodus.** [The Migration Track of *A. duodenale* within the Host in Oral Infection and the Mode of Infection through the Skin.]—*Mitt. a. d. Med. Fak. d. Kais. Univ. Tokyo.* 1916. Vol. 15. No. 3. pp. 411–452. With 8 plates. [Received July 26, 1921.]

The optimum temperature for the development of ankylostome eggs is 30° C. Sunshine is not only unnecessary, but actually harmful; oxygen and a certain degree of dampness are essential. The eggs are easily destroyed if left in putrid faeces. The following was found to be the best method of culture:—In a large petri dish containing culture medium a small dish containing a little water is placed; in 10, 20 or 30 days the larvae collect in this small dish. The cultural method was found the best for diagnosing ankylostomiasis; *Ankylostoma caninum* larvae were used. Oral infection takes place, but much less frequently than cutaneous. The larval migrations are complicated—some of the larvae introduced *per os* bore through the oesophageal and stomach walls and are carried by the blood stream to the right heart and so to the lungs, creeping thence by the bronchi, trachea, larynx and pharynx, and again via the oesophagus to the intestine. This happens also in cutaneous infection. Possibly some pass from the lung to the left side of the heart and then via the blood stream to the digestive tract. The first stage in development takes place in the lung; travelled larvae withstand chemicals and digestive juices much better than the untravelled. The occasional larvae found in the submucosa cannot all be accidental, but are possibly the larvae which reach the intestine via the blood stream.

Encysted larvae withstand digestive juices better than young larvae, while larvae which have passed through the lungs are the least susceptible of all. The author is convinced that the principal mode of infection by ankylostomes is through the skin and not through the mouth. He has demonstrated the prophylactic value of lime spread over fields.

R. T. L.

GOODEY (T.). **A Simple Method of Experimentation for Skin Infection with Hookworm Larvae.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 19–20.

The skin from the abdomen of a young mouse is pinned on to a sheet of cork about 3/16 in. in thickness. In the centre of the cork is a hole ½ in. in diameter. The cork raft with the attached skin is then floated on the surface of normal saline at 37° C. in a suitable containing vessel, care being taken to ensure that the saline comes into actual contact with the under surface of the skin. The vessel with the floating raft is now placed on the stage of a binocular dissecting microscope and a drop of water containing the ensheathed metamorphosed larvae of the hookworm is placed on the upper surface of the skin. The larvae can be seen wriggling downwards with their anterior ends pressing against the skin as though trying to pierce it. When the preparation has been left exposed for some little time to allow the drop to evaporate the larvae eventually break out of their sheaths and penetrate the skin. By fixing the preparation with hot alcohol an excellent mount can be obtained showing the larvae in the skin and the empty sheaths on the surface.

R. T. L.

KHALIL (M.). **Thermotropism in Ankylostome Larvae.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 16–18.

The metamorphosed larvae of ankylostoma show active wriggling movements between 20° and 30° C., but accomplish little change of position. If a heated point is applied to the containing vessel they invariably travel directly towards the source of heat. When a large number of larvae are used the process can be watched with the naked eye as a wriggling opalescent mass which disperses gradually after the hot point is removed and collects again when it is reapplied. This phenomenon occurs with the larvae of certain other nematodes, but not with all. It would appear to be a characteristic of skin penetrators, and may become a useful test by which these can be readily distinguished.

R. T. L.

VEVERS (G. M.). **On Some Developmental Stages of** ***Ancylostoma ceylanicum*****, Looss, 1911.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 25–27. With 4 figs.

Kittens were experimentally infected from a culture obtained from the faeces of a clouded leopard and the various stages of development of the growing worms were recovered *post mortem.* On their way from the skin to their final habitat in the intestine these worms undergo two ecdyses. Clear illustrations of the various stages are given. The last change, resulting in the appearance of adult characteristics, appears to take place on or about the tenth day after infection. Eggs do not appear in the faeces until about the fortieth day.

R. T. L.

WILLIS (H. Hastings). **A Simple Levitation Method for the Detection of Hookworm Ova.**—*Med. Jl. Australia.* 1921. Oct. 29. 8th year. Vol. 2. No. 18. pp. 375–376.

The method found most suitable and reliable for the detection of hookworm ova is based on the well-known facts that the eggs (*a*) will float in a salt solution of about 1,130 specific gravity, and (*b*) will adhere to a glass surface with which they come into contact [PEPPER, 1908]. The container used by the author measured 3·3 cm. in diameter by 0·8 cm. in height; it was filled about one-sixth full of faeces to be examined, and to this the salt solution was added gradually, the whole being thoroughly mixed. The container was then filled to the brim with solution. After a few minutes a glass slide was placed in contact with the surface of the liquid, allowed to remain a short time, and then examined. Usually two slides were prepared from each specimen. Records showed that this method gave a higher percentage of positive results than either the smear or centrifuge methods or their combination.

R. T. L.

BRUG (S. L.). **De methode van Baermann toegepast op het onderzoek der faeces op mijnwormeieren.** [Baermann's Method applied to the Search for Hookworm Eggs in Faeces.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 565–573.

After allowing the larvae to develop in the stool by leaving the samples spread out in a petri plate for two days, the author puts the faeces in a piece of folded gauze, which is hung up in a sedimenting glass full of water (BAERMANN's method; see this *Bulletin,* Vol. 12, p. 181). After four hours the larvae have slipped out and dropped to the bottom of the glass, where they may be collected with a pipette and counted under a microscope. The differential marks for anguillula [strongyloides] and ancylostoma larvae are given. The author considers the thick chitin wall round the oral cavity of the ancylostoma larva to be most important. Out of 100 samples of faeces 72 (in the original by mistake 62) seemed negative when examined directly, 15 of these giving positive results by the sedimenting test. The author claims that this method also may save time when making examinations in mass.

W. J. Bais.

BREINL (A.). **On the "Arneth Count" in Hookworm-Infected White Children in North Queensland.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 49–52.

On a previous occasion a shift of the Arneth index to the left was found in healthy aboriginal children of North Queensland analogous to that of children of European descent in North Queensland, but a much more pronounced shift was found in the native children of New

Guinea. Recently opportunities occurred for examining blood-smears from white children in North Queensland suffering from ankylostomiasis and living in an area where malaria is practically unknown. Any definite change must be attributable to hookworm infection. The total averages prove conclusively that the average Arneth index in hookworm-infected children shows a decided shift to the left. A comparison with the Arneth index of New Guinea children shows a striking similarity and strengthens the assumption that the comparative increase in the latter was due to the great incidence of latent and active infections in children, amongst whom hook-worm is probably widespread.

R. T. L.

LEGER (Marcel). **A propos de** *Necator americanus*, **Stiles, 1902.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 159–161.

Attention is drawn to a thesis dated Montpellier, 1868, by L. CAMUSET, and entitled " De l'anémie tropicale observée à la Guyane française." In this CAMUSET shows that MARÉCHAL had recognized that the hookworm found in South America was distinct from *Ancylostoma duodenale* and had indicated clearly the differential characters.

R. T. L.

ROUSSEAU (L.). *Ankylostomum duodenale* **Dubini 1843 existe en Guyane française à côté de** *Necator americanus* **W. Stiles 1902.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 89–91.

The author has recovered both species of hookworms from the stools of two cases which had apparently acquired the infections in French Guiana.

R. T. L.

DARLING (S. T.) & SMILLIE (W. G.). **Studies on Hookworm Infection in Brazil. First Paper.**—*Monographs of the Rockefeller Institute for Medical Research.* 1921. Feb. 1. No. 14. 41 pp.

With an index of infection based upon the number of worms removed by a test treatment of 3 cc. of chenopodium, the incidence of hookworm was estimated in 12 widely scattered localities of Brazil, and was found to average 136·1 worms per case. Almost no individual over eight years of age is free. Infection with *Ancylostoma duodenale* was found in every district, but was very light compared with that due to *Necator americanus*, and increased in places with a changing population and much immigration. Several problems of general interest in relation to improved methods of treatment were studied. It was found that the microscope was of doubtful value in the preliminary diagnosis. It does not yield an absolute index of the presence or absence of the parasites, and is of little value as an index of cure. Individuals in a community with an average infection of 200 worms each, who have received two routine treatments with chenopodium, still harbour an average of six worms each. Since their presence is of no material importance to the individual, the futility of tertiary and further treatments is apparent. Two routine chenopodium treatments in places of moderate infection removed more than 95 per cent.

of the hookworms harboured. In very heavily infected areas, with an average of more than 250 worms per case, a third chenopodium treatment is advisable. Betanaphthol in doses of 6 gm. daily for three successive days removes 96·4 per cent. of the worms. It is more difficult and more expensive to administer in the field. It does not remove Ascaris, and there is greater danger of serious intoxication. Five different combinations of chenopodium administration have been found quite satisfactory. They are in order of relative efficiency :—

1. Undivided 2 cc. dose followed in two hours by a saline purge. A preliminary purge was used.
2. 1½ cc. divided into three equal doses given one hour apart, the last capsule followed in two hours by a purge. A preliminary purge was given.
3. 1½ cc. divided into two doses of 0·75 cc. each and given two hours apart, the last followed in two hours by a purge. *No* preliminary purge was given.
4. 2 cc. undivided dose followed in two hours by a purge. *No* preliminary purge was given.
5. 1½ cc. divided into two doses of 0·75 cc. each and given two hours apart, followed in two hours by a purge.. A preliminary purge was given.

The preliminary purge in one and two is an important item of additional expense in field treatment. Method 1 is the method of preference under ideal hospital or dispensary conditions. Method 3 is the method of choice for field treatment. The toxic symptoms produced by the five methods are about equal, though there are always slightly more toxic manifestations when a preliminary purge is given. 3 cc. is the maximum dose of chenopodium for adults and 1½ cc. for children between 8–12 years old, and should never be given in routine field treatment. The dosage should never be measured by the " drop method," as this oil may vary between 18 and 70 drops to the cubic centimetre.

R. T. L.

DE CARVALHO (Aurelio Teixeira). **A lucta contra a ancylostomose no primeiro districto sanitario de Santos (particularmente no Morro de S. Bento).** [The Campaign against Ankylostomiasis in the First Sanitary District of Santos, particularly on S. Bento Hill.]—*Serviço Sanit. Estado São Paulo.* 1920. N.S. No. 20. 27 pp. With 18 plates.

The report deals almost exclusively with S. Bento hill, a district with a population of 954, housed in 162 dwellings, and in very high percentage illiterate and living under very insanitary conditions. The period covered by the report is March, 1917–October, 1919. The campaign comprised (*a*) introduction of sanitary reforms to protect soil and water from infection by hookworm, and (*b*) treatment of all cases presenting clinical symptoms of ankylostomiasis. No detailed figures are given. Of drugs commonly used preference was given to naphthol B., not only because of its proved efficacy, harmlessness and facility of administration, but also because of its comparatively moderate price. Thymol was not used, partly because of the greater care required in its administration and partly because the unpleasant symptoms it causes would have endangered the whole campaign. Its price, too, would have been a heavy burden. Oil of chenopodium was rejected because, apart from its being dearer than naphthol B., its toxicity rendered its use inadvisable, seeing that a single disaster would have been fatal to the work, exploited as it would have been by pamphleteers and the discontented. The author regards with some reserve the enthusiasm now prevailing for chenopodium, a drug which, in his experience, is a good vermicide with an almost elective action on Ascaris, but, as against ankylostoma, of inferior efficacy to naphthol B., more difficult to administer and with a bad record as regards toxicity.

F. S. Arnold.

DARLING (Samuel T.) & SMILLIE (Wilson G.). **The Technic of Chenopodium Administration in Hookworm Disease.**—*Jl. Amer. Med. Assoc.* 1921. Feb. 12. Vol. 76. No. 7. pp. 419–420.

In the present paper the authors record the results of their studies on the influence of various factors on the efficiency of chenopodium administration. A trial treatment of 1·5 cc. in divided dosage is followed by a test treatment of 3 cc. ten days later to remove all remaining hookworms and a comparison of the results of the two treatments is made. The conclusions drawn from the details of the experiments recorded in the paper are :—(1) a preliminary purge does not add to the efficiency of the chenopodium when the drug is given in two doses, 1·5 cc. being considered the adult dose. (2) A preliminary starvation period is not necessary, in fact the efficiency of the chenopodium treatment is lessened. (3) A small amount of food given coincidently with the divided doses greatly diminishes the efficiency of the chenopodium. (4) In the smaller doses that are given to children the decrease in efficiency of chenopodium caused by the factors of preliminary purge, starvation period, and food is much more striking than in the full adult dosage of 1·5 cc.

R. T. L.

McVAIL (J. Borland). **The Present Position with Regard to the Treatment of Ankylostomiasis.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 324–325.

The results of recent research would appear to the author to narrow the field of choice of anthelmintic in hookworm campaigns to thymol and oil of chenopodium. Before the war thymol was imported from Austria, but to-day an entirely satisfactory product is being made in India by steam distillation from ajowan seeds. The author considers that thymol should under no circumstances be chosen for treatment unless the physician is sure that certain precautions will be carried out. From the time of the first purge until the second has acted, no oil, ghee, fats of any sort, and particularly no alcohol must be consumed, no food must be taken and only the minimum amount of drinking water. While thymol is acting the patient must stay in bed. The patient should be seriously warned against taking alcohol to relieve the sinking feeling caused by purgation and starvation. The dose of chenopodium should be measured with a hypodermic syringe and the required quantity squirted into a hard gelatin capsule. If any toxic symptoms appear a purge of magnesium sulphate should be given immediately. Starvation and purges are unnecessary. No consignment of chenopodium should be used freely without previous careful clinical trial. There are some grounds for believing that in cases of kala azar complicated with ankylostomiasis it is better to treat the kala azar first.

R. T. L.

Caius (J. F.) & Mhaskar (K. S.). **The Correlation between the Chemical Composition of Anthelmintics and their Therapeutic Values in Connection with the Hookworm Inquiry in the Madras Presidency. vi. Oleum terebinthinae. vii. Oleum eucalypti. viii. Chloroform. ix. The Eucalyptus-Chloroform Mixture. x. Betanaphthol. xi. Extractum filicis liquidum. xii. Kousso. xiii. Kamala. xiv. Pulvis arecae.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 125–130; Oct. No. 2. pp. 372–378; 379–383; 384–394; 1921. July. Vol. 9. No. 1. pp. 33–55; Oct. No. 2. pp. 191–197; 198–201; 202–205; 206–209.

vi. *Oleum terebinthinae.*—In a series of 79 cases of hookworm treated with varying dosages of oil of turpentine, 11 out of a total of 1,316 hookworms were removed. No ascarids were expelled, though subsequently found in 25 cases. Similarly 16 cases of whipworm infection were unaffected.

vii. *Oleum eucalypti.*—Oil of eucalyptus is distilled from the fresh leaves of various species of Eucalyptus, the most important being *E. globulus* on account of its high eucalpytol content. Test treatments conducted by the authors confirm the conclusions of Darling, Barber and Hacker that eucalyptus oil is ineffective for the removal of hookworms and other intestinal worms. That it is a very weak vermicide may easily be gathered from the large number of worms which are expelled alive and the need of a strong purgative to remove them before they have time to recover from the drug. Pure eucalyptol ought to be used preferably to the oil itself but cannot be recommended for the eradication of hookworm infection.

viii. *Chloroform.*—Pure chloroform is decidedly effective as an anthelmintic agent against hookworms and is particularly potent against ankylostoma. Within the limits of 30–40 minims as a dose it has little effect on roundworms and has none against the whipworm. Most of the worms are expelled alive. The chloroform is evidently not a vermicide nor is it a vermifuge. It is essentially an anaesthetic and acts as such on the parasites. A vigorous purge is therefore necessary to sweep out the worms before they have time to recover from the stupefying effect of the drug. The authors' experience is, however, that chloroform is an unpleasant drug to handle even in the smaller doses of 45 minims advised. Toxic symptoms are occasionally noticed even with a dose of 30 minims. The after-effects of chloroform medication are *nil*. The conclusions stated are: (1) pure chloroform *in combination with castor oil* ranks high as an anthelminthic against hookworm; (2) provided hospital conditions are possible the chloroform treatment recommends itself wherever ankylostome infection prevails.

ix. *Eucalyptus Chloroform Mixture.*—Hermann was the first to use this mixture, which has since passed under a variety of names. From the experimental data detailed in this paper it is evident that chloroform in this mixture alone has an anthelminthic value and that eucalyptus is superfluous and may be dispensed with altogether. The suppression of the eucalyptus would lessen its toxicity, reduce its cost and facilitate its administration. The mixture is a very weak vermicide as the toxic and anthelminthic effects reside in the anaesthetic property of the chloroform. As a strong purge is essential to expel the anaesthesized worms, the castor oil is an essential part of the mixture. There will always subsist an element of doubt as to both the safety and the efficacy of this treatment.

x. *Betanaphthol.*—Betanaphthol is a solid drug of constant composition easily obtainable in the pure state and does not deteriorate with age. It is a powerful vermicide on Ankylostomes and Necators, and in sufficiently large doses is an effective ascaricide. It is a safe drug up to 60 grains dosage. No after-purge is required. Dose for dose it is safer and more efficient than thymol. Up to a dosage of 40 grains advantage lies with a single portion treatment; beyond 40 grains the drug may indifferently be given in one, two, or three portions. Fifty grains may be taken as the optimum dosage and 60 grains as the maximum for adults. The drug has a vermifugal action promoting physiological evacuation of the bowels. The cases of haemoglobinuria and all the fatal cases recorded in literature followed upon either the administration of a dose higher than 60 grains, or, more frequently, upon continual administration for several successive days. Ankylostoma is more resistant to this drug than Necator. The drug is absorbed and is eliminated by the kidneys. The absorption is relatively slow, while elimination is rapid, never extending beyond 24 hours after treatment.

xi. *Extractum filicis liquidum.* The rhizome of male fern has been a favourite anthelminthic since the times of THEOPHRASTUS, DIOSCORIDES, PLINY and GALEN. It seems to have been administered generally in 36 grain doses. The extract is a thick, dark-green oily liquid obtained by exhausting with ether the powdered rhizome. So far there is no consensus of opinion either as regards the chemical nature of the different constituents or their respective therapeutic values. The active principles readily deteriorate. Only two active principles, filicin and filmaron, need be taken into consideration. These are both neurotoxic and myotoxic poisons. Ninety minims is the admissible dose. In a series of 51 cases treated, 38 hookworms out of a total of 1,285 were removed. The worms were dead when expelled. No ascarids were removed, though present in 14 cases. No tapeworms were passed in six infected cases. The authors conclude that extract of male fern cannot be recommended as an anthelminthic.

xii. *Kousso.*—Extracts of dried female flowers of *Brayera anthelmintica* have long been used as a taenicide. Of the cases treated by the authors, one who had received 3½ drachms of the drug passed 33 hookworms out of a total of 38. In 12 cases treated with doses ranging from 2 to 5½ drachms only 2 out of a total of 86 hookworms were removed. Neither roundworms nor whipworms were removed though seven cases of the former and two of the latter were treated. Kousso cannot be recommended as an anthelminthic.

xiii. *Kamala.*—Kamala consists of the minute glands and hairs which cover the capsules of *Mallotus philippinensis*, a small evergreen tree found throughout tropical India. The authors' results show that kamala cannot be recommended as an anthelminthic. In a series of seven cases treated with doses ranging from 1 to 2½ drachms given in one portion without any purge only one hookworm out of a total of 407 was removed. No worms were removed, though three cases proved to harbour ascarids and five cases whipworms.

xiv. *Pulvis arecae.*—The areca or betel-nut palm is widely cultivated in tropical countries of the Far East, where the nuts mixed with lime and betel pepper form the well-known masticatory. In China and

India the ground areca nut is used as an anthelminthic. It is also considered to be a powerful astringent which tends to counteract the relaxation of the bowels, to which the heat of a tropical climate so strongly predisposes. The authors cannot recommend Pulvis arecae as an anthelminthic. In a series of 10 cases *no* hookworm was removed, though subsequently 232 Necators and 9 Ankylostomes were recovered. No worm was expelled from two cases of roundworm and two of whipworm. The dose given was four drachms of ground dried nut without previous preparation of the patient.

R. T. L.

i. LELLIS (Areobaldo). **O chenopodio e a sua toxidez.** [On Chenopodium and its Toxicity.]—*Brazil Medico.* 1921. July 9. Year 35. Vol. 1. No. 28. pp. 358–360.

ii. DE ALMEIDA (Junior) (Theophilo). **O chenopodio e a sua toxidez.** —*Ibid.* Sept. 17. Vol. 2. No. 10. pp. 132–134.

i. The author states it as his opinion, based on an extensive experience of ankylostomiasis and its treatment in the hospital of Santa Casa de Misericordia at Victoria (Brazil), that the reputation for toxicity attaching to chenopodium is due to its routine association with chloroform in administration. He states that since he has abandoned the practice of giving chloroform with chenopodium, and has given the latter drug alone, he has observed no toxic symptoms whatever, even with large doses and in cases in which the effect of purgatives was delayed, so that full time was given for any toxic symptoms due to the chenopodium to show themselves. The author further states that he has found entirely unnecessary the rigid dietary regulations generally laid down for patients under treatment by chenopodium *so long as the drug is given by itself.*

ii. The author dissents *in toto* from the theory of LELLIS, and cites two cases in which doses of chenopodium within the generally accepted limit of safety for age, administered without chloroform to children of two and three years respectively, were followed by fatal collapse.

F. S. Arnold.

BAERMANN (G.). **Ueber Ankylostomiasis, deren Ausbreitungsbedingungen durch die Bodeninfection und deren Bakaempfung.** [The Conditions of Spread of Ankylostomiasis by Ground Infection and its Control.]—*Geneesk. Tijdschr. v. Nederl-Indië.* 1917. Vol. 57. No. 5. pp. 579–669. With plate, charts and plans.

The most important addition to knowledge in this long and interesting paper, which has unfortunately hitherto escaped notice, is the discovery that under the conditions therein described ankylostome larvae harbouring in the soil are not diffused over wide areas but are concentrated in the neighbourhood of latrines and in the constantly damp soil around vessels where water is stored and frequently spilt by the natives, especially within buildings. This discovery, based on a novel method of detecting the larvae in soil samples, devised by the author, has enabled him to take precautions against these sites of maximum infestation, and so against reinfection after mass cures.

The plantations on the East Coast of Sumatra are worked mainly by Javanese and Chinese coolies on long term contracts. They live in large common dwellings, housing 50 to 500 each, called pondoks, and it is to their conditions that the author's studies refer.

The curative measures and soil prophylaxis hitherto practised have reduced the density of infection greatly, but have failed to eradicate it. Only constant attention and renewed efforts keep the disease within certain bounds.

The author details the measures taken to protect the soil from infection.—An area 25 to 30 metres wide round the pondoks is cleared and kept free from soil, and any trees which stand too near are cut down. The latrines are made 20 ft. deep and conical downwards; the depth lessens the smell and makes frequent filling of the hole, and therefore change of site, unnecessary. The excavation is covered with strong planks in which 1 ft. square holes are cut. Walls and roof consist of corrugated iron, wood or atap. The planks are thoroughly cleansed with water daily and with a disinfectant every eight or ten days. The latrine is placed as near as possible to the pondok, in any case within the 25 metres area. The author says that if the latrines are suitably built, well ventilated, kept constantly clean and as free from smell as possible, most Javanese will readily use them. European supervision is, of course, necessary. In ten years the mortality on these estates has been reduced from 40 per mille to 4, a saving, according to the author, of 342,000 guilders, apart from increased production, and this nearly equalled the cost of the hospitals. He notes that in one year, 1911–12, no sanitary prophylaxis was carried out and that the mortality rose to 34 per mille. Naturally other diseases were being combated at the same time, but ankylostomiasis is by far the most important. Synchronously with the ten-fold reduction in mortality has occurred a ten-fold increase in living births on these estates, which in a thinly populated country is of real importance.

The result of these measures—curative and sanitary—practised for ten years was that 80 per cent. of the coolies at any time were useful workmen, with light infections, that fresh light infections and reinfections were frequently occurring, and a percentage of severe infections of 1 to 1·5. It was obvious, therefore, that somewhere the anti-hookworm measures were defective, and it was necessary to decide whether the drugs used were wanting in efficacy, or frequent opportunities for local infection were occurring. In the discussion of the latter alternative lies the chief interest of the paper.

The author has shown that ankylostome larvae wander from earth into water, moving in loose earth at the rate of 1 cm. per minute; that from loose earth all have gone in 24 hours, and most after the first half-hour; that many more move downwards than move upwards; that the mixing with water and breaking up of lumps of earth expedite their removal [see this *Bulletin*, Vol. 12, p. 181]. A series of experiments was now made, lasting six months, to determine the effect of moisture and drought, sun and shade, on the persistence of the larvae in earth. Boxes containing one-eighth of a cubic metre of soil were used, on the surface of which an infected stool was spread. Some were first planted with grass or low shrubs. It was found that planted soil afforded very favourable conditions for the development and month-long persistence of larvae. In unplanted soil the larvae did not develop when exposed to sun with little rain; they did so when rain was abundant, but soon died off again in drought. A network of roots or a little grass was sufficient to retain the necessary moisture. Shade was always a favourable factor. The larvae were not found on the surface, but close beneath it and at greater depths. It is readily seen that in wet ground the weight of the foot will open up the soil sufficiently to give the larvae a chance to reach the skin; infested particles of earth will be carried away on the feet and thus allow the larvae time to penetrate. Other kinds of nematodes and nematode larvae are found also, but the ankylostomes can be recognized with or without their sheaths, for these are often shed.

To get an idea of the possibilities of ground infection, the author investigated by his special method the 24 hours' stool of a heavily infected untreated woman a day before her death. In the first four hours, 866,800 larvae made their way into the water, and after four days a total of 1,141,600. The stool weighed about 100 gm. After death the worms in the gut were carefully counted and numbered 1,986, of which 1,102 were females, which gives 1,036 germinable eggs for each per day. A large number of counts gave a proportion of 60 females to 40 males, and of 50,000 worms 92 per cent. were Necator and 8 per cent. Ancylostoma. The cases from which these figures were taken were hospital cases. To get comparative figures from an estate with favourable hygienic conditions, the author took into hospital the inhabitants of two pondoks, 130 persons in all. The average number of worms obtained from them after treatment was 86. A series of persons from another pondok gave an average of 225 worms. From these and other figures it is calculated that for every coolie there may be 68 female worms, capable of producing daily over seven million viable eggs.

The author was now ready to investigate samples of soil for larvae. He uses a funnel, to which is attached an india-rubber tube clipped below. This is filled with water, and into it is fitted a sieve of brass, with meshes 1 mm. wide, in such a way that it dips 2–2½ cm. below the water surface. In the sieve is placed a coarse-meshed cloth, upon which the soil, broken up and stirred with water, is laid. This is to avoid the difficulty of cleaning the sieve, the cloth retaining all, or nearly all, the soil. The complete apparatus can be cleaned and boiled after each use. The larvae make their way into the water in the funnel and tubing. After 24 hours the 40 cc. of water is drawn off into a wide test tube, allowed to settle, the supernatant fluid poured away, and the few drops at the bottom are examined on a slide. This will always contain other kinds of larvae, and for ready differentiation 7·5 per cent. caustic potash is added, one drop to five drops of the fluid. All unsheathed larvae are rendered immobile, while the ankylostomes are unaffected. In every case, for assurance, the oesophagus, oral opening, genital cell and excretory pore are scrutinized. The diagnostic points are discussed.

The information thus obtained was now applied to the investigation of the estates, samples of earth being taken from various points which are indicated on plans. It was thus found that in all latrines, even the best constructed and the cleanest, ankylostomes could be found in the immediate surroundings, and the bad latrines were a great danger, because the users carry away particles of faeces on their feet into the sleeping rooms and neighbourhood of the pondoks. Even on estates with good latrines reinfection of some coolies was constant, and observations of the kind are well illustrated in the table.

	Relapse treatments in coolies treated two, three, four, five and six months before, to the complete or almost complete eradication of their worms.					Relapse treatments in persons who had been thoroughly treated in hospital 1 to 2 years before.	
	Two months.	Three months.	Four months.	Five months.	Six months.		
	3	0	0	0	0	652	Worms expelled.
	4	0	3	2	3	568	
	9	2	14	7	10	1,318	
	18	9	17	19	14	1,097	
	48	16	25	25	34	334	
	78	26	34	33	191	1,493	
	164	30	38	43	329	1,210	
	—	48	56	55	486	586	
	—	53	72	92	581	204	
	—	144	78	96	—	768	
	—	320	92	259	—	461	
	—	—	94	—	—	2,069	
	—	—	98	—	—	628	
	—	—	99	—	—	756	
	—	—	99	—	—	491	
	—	—	104	—	—	378	
	—	—	159	—	—	294	
	—	—	160	—	—	534	
	—	—	178	—	—	208	
	—	—	341	—	—	328	
	—	—	—	—	—	1,047	
Total worms expelled ..	324	648	1,761	631	1,648	15,442	
Average ..	46	59	88	57	183	738	
Index of Infection per die ..	0·75	0·65	0·72	0·4	1·0	1·3	

It is noted that the coolies who furnished the figures for two to six months were selected without reference to symptoms.

It was concluded from these figures that infection must be occurring either in the places where the coolies work or in their houses or the surroundings of these. It is only the tappers who work continually over the same ground; investigations of such ground were made in the case of some who were heavily infected, but with negative result. Attention was therefore turned to the pondoks. These stand either directly on the ground or raised 1–3 ft. on boards, the so-called "lante." Some have a verandah 3–6 ft. wide, the so-called "kaki limah," on which the coolies spend much of their time. Larvae were found in the ground of all the living rooms of heavily infested coolies, and almost exclusively in the water places. Behind the door the coolie is accustomed to keep a petroleum tin, or barrel of drinking or washing water, especially for the night. Whenever water is spilt, and this constantly occurs, conditions are favourable for larval development, and here the larvae are found in great numbers. The author suggests that they are brought on the coolies' feet either from the latrines or from other places where they defaecate. He notes also that after defaecation the native washes the anal region and usually at his house. Infection of the room cannot occur if the pondok is on a lante, but, unfortunately, in this case the water supply is frequently kept on the kaki limah. In the case of the lante, particles of stool may be washed through the boards and development go on in the space underneath, which is frequently used for various purposes, and is therefore trodden by the coolies. The lante pondoks are preferable to those on the ground, and estates with the former usually show less severe infections, partly owing to the fact that the sun reaches the kaki limah, but not the interiors.

A further proof of the importance of " room infection " is its severity in the women as compared with the men. In the figures for three years the severely infected men average 0·9 per cent. of the force, the severely infected women 2·6 per cent. The women spend a longer time in the rooms over household work, which demands the use of water. Unmarried men, who have to do their own housework, often have as high infections as the women. Children are seldom found infected before the age of five; at first they are carried and they do not use the latrines. Heavily infected couples rarely have children; the mothers abort.

Water barrels are also found in or near the kitchens, and here also infections occur. The larvae-infested ground need not be wet on the surface; it is frequently dry, but the layers below are damp. As a rule the larvae are in the upper five centimetres. Ground that is always freely exposed to the sun is always negative. The chief source of infection is filthy latrines. If they cease to be used, shady damp places are selected by the coolies, and in their turn become dangerous foci. A number of illustrative cases are given, with sketches of estates and the buildings thereon.

The author compares his figures with the much lighter figures of SCHÜFFNER, whose work was also done on the east coast of Sumatra. The differences are due to the fact that SCHUFFNER's coolies were workers on a tobacco plantation and were Chinese. The tobacco coolies change their place of work, so that severe reinfections are almost excluded, and the older Chinese dig their own latrines and use them. When Chinese work on rubber plantations they get heavy infections, like the Javanese. When former contract labourers, heavily infected with ankylostomes, go to live in native villages they frequently by degrees lose their infections. One such village is described, in which the inhabitants gave low or negative results, and the findings in the latrines and houses were also negative. Each house had its own latrine—it was usually on a lante—and the surroundings were kept quite clean. A Chinese village is described, very dirty with damp surroundings, without separate latrines, but with a common latrine on piles over a stream; the inhabitants wore wooden clogs, and the rate of infection was low.

In the conclusions to this part of the report the author insists on the importance of the concentration of the population and of their faeces in producing the heavy infestations which he has described. Even then time is needed, and for such a condition to develop on a new estate takes four years, though the average Javanese brings with him an infection of 131 worms per man; 700 worms at least are needed to produce severe symptoms. In free natives the infestations are very seldom severe.

A simple solution for the rubber estates would be separate houses for the coolies, but this, for various reasons, is impracticable. Similarly with the wearing of shoes: the author reckons this would cost, for 20,000 coolies, 100,000 florins yearly, and their wear could not be assured in the most important place—within the pondok. Without moisture the larvae do not develop, and the obvious course is to remove the water stored in and round the pondok. This, however, is impracticable. If the water were removed the coolie would find other means and ways of bringing it in, and were the prohibition insisted on he would seek employment on other estates in which the rules were less rigid. The water places may, however, be reduced in number, and those that remain may be made less dangerous.

The author has made experiments on the disinfection of these circumscribed areas, which he proceeds to relate. The substances tried, with more or less success, were lysol, izal, hycol, Jeyes' fluid, carbolineum and crude creolin. Some 50 larvae, about 14 days old, were placed in 2 cc. of various strengths of the disinfectants and observed under the microscope at intervals of five minutes, and to obtain more accurate results larvae which became immobile were placed in an earth sample to see if they would revive and wander out into water. Such revival did indeed take place. The best disinfectants for the purpose were izal and hycol. The experiments were then repeated with samples of one-eighth cubic metre of earth to which larvae had been added in great quantities, and it was shown that 10 litres of a 2½ per cent. solution of izal would almost completely sterilize one-eighth cubic metre of soil. Other experiments were made with boiling water, it having been shown that ankylostome larvae die at 50° C.; it was found to be effective in quantities of 10 and 15 litres. Lastly, the two methods were combined. The experiments were applied thus: the damp earth in the rooms at the water places was broken up with a spade to a depth of 25 cm. over an area of ½ sq. metre and a petroleum tin of boiling 2 per cent. izal (15–18 litres) was poured over it. The procedure was similar at the water places on the kaki limah and in the kitchens. This is repeated every six months or oftener, or boiling water can be used once a month.

A disinfection brigade is recommended, to consist of a native overseer and two men, acting under the direction of the medical officer. The brigade is supplied with kettles, watering cans, disinfectants, and the like. The water vessels are removed from the living rooms and kitchens and placed on a cemented kaki limah. The space under the lante is closed by barbed wire or otherwise. The cook houses also are cemented, as are all water channels in or near the pondok. The latrine is connected with the pondok by a covered way and is lighted at night. Its floor is constructed of stone and cement and sheet-iron or sheet zinc, so that with sufficient use of water there is no fouling. Full details of the best construction are given. The manager and his assistants must be well instructed in the prophylactic measures and the reasons for them.

A. G. B.

MHASKAR (K. S.). **Hookworm Infection and Sanitation.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 398–406.

The sanitary conditions of Trichinopoly Jail could scarcely be improved upon, and afforded the author a favourable opportunity for determining whether sanitation has any bearing on hookworm infection. He concludes that the incidence of hookworm infestation is not appreciably affected by jail life under the most suitable sanitary conditions because (*a*) the span of life of the worm may extend beyond 16 years; (*b*) improved sanitary conditions do not exclude all possibility of reinfection; (*c*) even on the suppositions of no reinfection and a progressive elimination, all would pass from a higher to a lower degree of infection. That a natural progressive elimination of the worms does take place is illustrated by a series of counts which show that an infection averaging 58 hookworms per case on admission had fallen to 48 per case after one month's stay in jail, and gradually dropped to 32, 29 and 17 worms per case after respectively 3, 12 and 18 months' stay. Beyond 18 months of jail life the number of hookworms remained fairly constant, and even such a long stay as 17 years does not seem to bring complete sterilization. A table showing the percentage of Ascaris and Trichuris infections at different periods of stay in jail gives evidence that jail life is not favourable for the propagation of either of these infections.

R. T. L.

MAPLESTONE (P. A.). **A Note on the Question of Hookworm in Pigs.**—*Med. Jl. Australia.* 1921. July 9. 8th Year. Vol. 2. No. 2. p. 20.

An examination of 182 pigs in the Townsville district of Queensland gave no indications of infection with hookworm. There is no evidence of practical danger of the spread of ankylostomiasis by pigs in North Queensland.

R. T. L.

LEGG (John) & RHEUBEN (J. A.). **Note on the Finding of** *Anchylostoma duodenale* **in the Intestines of the Pig.**—*Med. Jl. Australia.* 1921. Nov. 5. 8th year. Vol. 2. No. 19. p. 398.

This note records the presence of *Ancylostoma duodenale* in semi-domesticated pigs coming from Cromarty, near Townsville. The diagnosis was made by Dr. Georgina SWEET, of Melbourne University, and confirms a previous find by O'CONNOR, in the Ellice Islands.

R. T. L.

BOOK REVIEWS.

The Practice of Medicine in the Tropics. By Many Authorities. Volume I. Edited by BYAM (W.) [O.B.E.; Lieut.-Colonel, Royal Army Medical Corps (retired); etc.] and ARCHIBALD (R. G.) [D.S.O., M.D.Edin.; Major, Royal Army Medical Corps (retired); Director of the Wellcome Tropical Research Laboratories, Sudan Government, Gordon College, Khartoum; etc.].—xxii + 856 pp. and index. With 35 plates and 334 illustrations in the text. 1921. London: Oxford Medical Publications. Henry Frowde and Hodder & Stoughton. [Price £4. 4*s*.]

The ancillary and cognate subjects of medical zoology, laboratory technique, hygiene, and toxicology form almost the whole of this big first volume on the Practice of Medicine in the Tropics. This, however, will not appear strange to those who regard the phenomena of tropical disease as taking their particular bent very largely from indigenous social conditions. In the tropics, outside the great municipal centres of European activity, man has not fairly put the jungle under his feet, and lives more at the mercy of his organic environment than by any recognized sanitary standards; and, as a consequence, the medical practitioner from Europe is constantly faced with problems and responsibilities that demand a fuller and more practical acquaintance with medical entomology, and such other subjects as are dealt with in this volume, than is necessary in the more conventional practice of his own country. The volume is composed of five sections, which may be considered individually.

The first section is a treatise, by Dr. Andrew BALFOUR, on personal hygiene and rural sanitation, or, as it is here called, " minor " sanitation. Under the heading of personal hygiene the many details—of food, drink, clothing, exercise, habits, equipment, etc.—bearing upon the maintenance of individual health and well-being in the tropics are discussed. Incidentally, the question of the permanent acclimatization of the white man is impartially considered—a question that some day must become of great importance, even outside Australia. Dr. Balfour seems to keep an open mind on the subject, though he thinks that the balance of evidence is in favour of the affirmative answer given by GORGAS—an opinion which, although it may not be consonant with *a priori* argument, is supported by certain experimental evidence of an unwitting kind, namely, by the history of the " poor whites " of Barbados, and Grenada, and by the strange account of the sturdy present-day descendants of the Dutch couples marooned in oblivion in the year 1665 on the island of Kissa, off Timor [*circ.* lat. 10° S.]. The subsection entitled " Minor Tropical Sanitation " is minor only in the sense that big cities and the paraphernalia of the sanitary engineer are not included in its scope. In details it is domestic and rural sanitation with the necessary modifications for climate and other tropical conditions consistently emphasized and carefully worked out. The chapter on habitations is full, but concise: the multifarious points to be considered in the design and construction and protection of a European house and its annexes are all reviewed, certain points to be attended to in constructing native houses are pressed, and contrivances for ensuring the salubrity of encampments are discussed. Nothing, however, is said about hospitals, although it is not an unusual experience for a young medical officer in the tropics to have to choose a site for a small hospital and to give advice about its design. In the excellent chapter on water there is a good deal that may be found in ordinary text-books, but simple methods of purification that lie within the competence of the medical officer himself are well described. There is a very full chapter on methods—mainly dry methods—of dealing with excreta; and the author, out of his great experience, is not afraid to allow that there are very hot and dry tracts where, if there is a good service of scavengers and set bounds are strictly observed, the elaborations of the latrine may be demitted. Very particular attention is given to the prevention and destruction of vermin, particularly flies. The only pages that fall below the high and apposite standard of this section are the few on animal foodstuffs, those on fishes in particular being lean and scrappy. The figures of fishes, too, though artistically fine, are not well chosen; of the eight shown, five (three sea-perches and two clupeoids) are quite like familiar British forms.

A very instructive chapter, by Dr. Malcolm WATSON, on Mosquito Control, which one would expect to find under the general heading of Sanitation—especially as its author, out of the fullness of his experience, pronounces anti-mosquito operations to be the proper business of the sanitary authority—is placed in the section on entomology. The author shows how necessary it is that the "measurement of malaria," by spleen examination and by hospital and mortality statistics, should go hand in hand and keep pace with all anti-mosquito enterprises, since it constantly reveals clues that may lead quickly to definite results. He shows also how essential always is the study of local oecology, since the measures that, in one type of environment, may lead to the disappearance of a dangerous species, may, when applied in another type of environment, help another dangerous species to settle and spread. His remarks, also, on the various methods of mosquito-control are seasoned with experience of their particular applicability and comparative cost. One could wish that something more had been said on the bionomy of Anopheles larvae, and that the subject of host-preferences of the adults had been opened out, as these are matters which have attracted a good deal of attention of late, and are matters about which the author must know a great deal.

An isolated section on Nursing, by Colonel Tull WALSH, might also perhaps have been placed under the general heading of Sanitation. In distant up-country stations nurses cannot be procured, and in cases of serious illness the medical man must be prepared to instruct and encourage a relative or friend of the sick person not only in the duties of the sick-nurse, but possibly also in some of the contributory expediencies of the cook; and in dealing with all the responsibilities of this situation the author is so full and so clear that even a trained nurse might profit by his instructions. Besides care of the patient and amelioration of his environment, the special responsibilities of particular diseases and the care of the infant and the young child are considered. Beyond this, there are pertinent remarks on matters of caste, native susceptibilities, etc., and also on the protection of medical stores and equipment from insects and the deleterious effects of climate—all of which will be found useful by the trained nurse in tropical institutions.

Throughout the Entomology section the contributions are copiously and most artistically illustrated. Here the ticks are dealt with by Mr. C. WARBURTON in 16 pages, with 32 figures in the text; their general characters, superficial structural features, and generic differences are clearly described, and the habits, bionomy, and pathogenic relations of certain species are briefly considered. The bionomy of *Ornithodorus savignyi* is said to be essentially the same as that of *O. moubata*; but the habits of these two species are certainly different, the former in India and E. Africa being active in daytime. The table for identifying the several genera of Ixodidae is admitted to be "rough and ready," and is also not quite safe for the uninitiated.

The blood-sucking lice are undertaken by Dr. Ll. LLOYD, who describes their external and internal structure and their life-history and pathogenic activities very clearly, and goes very thoroughly into methods of disinfestation. Mr. M. MACGREGOR gives a useful account of the bugs and also of the fleas that come within the purview of the sanitarian, always keeping well to the point. He seems to have overlooked that notorious member of the Reduviid family, *Rhodnius prolixus*, and also some of Bacot's more recent papers on the biology of fleas.

The blood-sucking midges are treated in masterly fashion by Mr. H. F. CARTER. The account of the Culicidae is, from the medical standpoint, all that can be desired—alike in design, proportion, and necessary detail; and the keys for identification of the species of Anopheles arranged according to zoo-geographical regions are just what is wanted. The 14 fine coloured plates of notorious species of mosquitoes are a suitable embellishment to the text. It is pleasant to find the ingeniously-named genus *Ramcia* maintained (as distinct from Corethrella), and the familiar name *Anopheles sinensis* upheld against the arbitrary alias " hyrcanus."

The Tabanidae, which are dealt with by Mr. H. H. KING with admirable brevity, are illustrated by numerous appropriate and artistic figures and a very beautiful coloured plate.

Dr. L. O. HOWARD and Mr. W. D. PIERCE are responsible for the important chapter on Diptera noxious to health by methods more subtle and devious than sucking blood. Their treatment of this difficult subject is extremely sound, the pure entomology being properly directed and justly subordinated to its practical bearings and applications. Attention is concentrated on the pertinent species, the more important of which are well figured, and they are treated according to their pathogenic activities in two groups, composed respectively of those that spread pollution and infection, and those that do explicit mischief of the kinds known as myiasis, the latter again being analysed in four groups according to their road of attack and field of parasitic activity. Of those that spread disease, the specific pathogenic associations, actual and potential, are fully catalogued, and the bionomy is briefly considered in relation to preventive and palliative measures. Of the miscellaneous lot of maggots that may get into the alimentary canal a synoptical table is given. One notes with gladness that the generic name Chrysomyia is retained for the screw-worm fly.

The blood-sucking Muscidae are handled by Dr. LLOYD and Major PATTON. Here again the entomological descriptions are abundantly illustrated by clear and artistic figures (including a fine coloured plate of *Glossina palpalis*), and the differential characters of the genera are conveniently summarized in a key. The tsetse flies naturally fill this stage, being considered generally in their biology and taxonomy, and also specifically (as regards the more notorious forms) in their habits, haunts, breeding-places, etc.; some principles of prophylaxis are briefly discussed, but the controversial question of destroying big mammalian hosts is intentionally relegated.

The chapter by Dr. S. A. NEAVE on the making of entomological collections is rather more suitable for a manual for explorers than for a treatise on tropical medicine. As regards its matter there is, of course, little to criticize, except that one may object to killing-bottles containing that nasty hygroscopic substance KCN. and also to the method, when pins are not available, of packing mosquitoes in pill-boxes with *cotton-wool.* It is to the limitations of the matter—for which the author may be assumed to be less responsible—that objection may be taken. What the ordinary medical man more often wants are hints for dealing with things of medical interest that cannot be preserved by any general methods with which he is already familiar—hints, for instance, for making a collection of dry Diptera without pins and entomology forceps and store-boxes. And even more than this, he wants advice about the collection, management and manipulation of living insects, etc., for experimental purposes in the laboratory, and about the dissection and microtomy of insects.

The stated aim of the section on Laboratory Methods is " rather to supply the laboratory worker in the tropics with information that will be of practical value, and also to include methods involving simple technique which may be of assistance to medical men working in ' out stations,' whose armamentarium consists of a microscope, a few slides and cover-glasses, and an equally small selection of stains." The execution of this aim is well entrusted to Major R. G. ARCHIBALD, and in surveying the detailed information furnished by him regarding the equipment of the laboratory, the care of the microscope and all its adjuncts, the making and staining of films and sections, the properties and uses of a large selection of stains, the examination of the blood in its cellular and other particulars, the examination of faeces, urine, and pathological fluids, the estimation of agglutinins, the investigation of parasitic skin diseases, and all the points to be attended to in a post-mortem examination in the tropics, one would be inclined to think that the aim has been adequately and admirably fulfilled. One cannot but feel, however, that its range has been somewhat strained by the inclusion of serological tests, and exceeded by the inclusion of a large tract concerned with culture media and their preparation. Indeed, at this point the question emerges—and becomes very audible when the long subsection on sera and vaccines opens out—whether these matters, at once so technical in their due performance and so universal in their appeal, come fairly within the scope of a volume dedicated to the *practice of medicine* in the *tropics*. It is not the inherent value of the information here set forth at such length that is questioned, but only its pertinence to and congruence with the avowed title. This section ends with more obviously useful chapters on the transfusion of blood, and on the setting up of an anti-variola-vaccine establishment in the tropics, this last by Dr. A B. GREEN.

Majors H. W. ACTON and R. KNOWLES contribute the section on Snakes and Snake-poison. The clear, profound and comprehensive investigations of snake-poison by these distinguished workers have already been noticed briefly in this *Bulletin* (Vol. 9, pp. 237–241). Here the poison-apparatus in all its details, the mechanism of the bite, the estimation of the quantity of venom secreted and available for discharge by different species, the chemistry and toxicology and potency of venoms, the nature and action of anti-venenes—all these and other subsidiary matters are admirably discussed both in themselves and in their practical bearings on symptoms, prognosis and treatment. There are also some sufficient remarks on the general characters of snakes as an order of reptiles. But the authors have done indifferently in appending to their own first-class stuff no less than 29 dreary pages of catalogue, wherein many of the terms of classification are misleading either by their insufficiency of definition or by their want of necessary qualification. This is not the place for discussing the principles of a zoological classification, but at least it may be said that the uninitiated person who attempts to identify a given snake by tables based on superficial characters will often find himself in a desperate dilemma. There can be no doubt, however, as to the impressive value of all the other parts of this section, quite apart from the Indian mortality returns, which the authors quote without comment. As regards these returns, which give the annual number of deaths from snake-bite as between 20,000 and 25,000, it must be remembered that for rural India they are avouched in the first instance by the village " chaukidar," or watchman, recently touched off by Colonel WALTON as " an ignorant rustic, who arranges his figures in accordance with local expediency rather than with the facts, even as he interprets them." It must also be borne in mind that since in Hindu estimation the cobra is a divinity, death from snake-bite is accounted honourable, and, of course, *reflects* honour. In this section the coloured plates, which represent only Oriental species, are not very good.

The final section on Toxicology contains a mixed chapter on vegetable poisons and poisonous and venomous fishes, and another on the chemical investigation of medico-legal cases. In dealing with vegetable poisons, Dr. Harold SCOTT confines his attention to those which, being used for suicidal or criminal purposes (or taken accidentally), have come to be regarded as practically restricted to the tropics, and also—with appropriate limitations—to those of general employment which are used exclusively in the tropics for a particular purpose (*e.g.*, arrow poisons). As the author says, the subject is as difficult to classify as it is to define, and after due consideration he selects an alphabetical arrangement as the most convenient, For each plant particulars of locality or distribution, poisonous parts, mode of use, etc., are given, and also, as far as possible, particulars of its action, effects and symptoms, and of treatment, antidotes, etc. There are some good plates, plain and coloured. The account of poisonous and venomous fishes is, of course, lacunar, and there is here too much, not very apt, zoological scaffolding.

The chapter by Mr. W. M. COLLES on the chemical investigation of medico-legal cases is clear and to the point: it sets forth a short systematic scheme for the detection of the common poisons used in the tropics, beginning with comprehensive instructions for the collection and immediate treatment of suspected material.

Taken as a whole, the book is well printed and very well got up, though it is inconveniently heavy—its weight being over 5½ lb. The illustrations are on a generous scale, and with very few exceptions they are first-class and lend meaning and distinction to the text. The index is very complete, though perhaps a little too impartial in its attentions to the subject-matter. In dealing with a single volume it is, of course, impossible to form any judgment of the proportions of its individual parts to the whole work; but taking this one volume it may fairly be said that 80 pages on snakes greatly overtops 224 on medical entomology, and, again, that 224 pages of medical entomology rather overmatches 188 on laboratory methods. If the 188 quite fully sufficient pages on laboratory methods are—as I think they may be—held to fall in good proportion with the projected design of a 2,600-page work on the practice of medicine in the tropics, then one may argue that all the other contributions to this 856-page first volume—except, perhaps, hygiene, sanitation and nursing—are overdone, and the argument does no offence to the (admitted) intrinsic merits of the individual contributions.

The frontispiece portrait of Sir Patrick MANSON is a happy inspiration which will appeal to all students of tropical medicine.

A. Alcock.

KNUTH (P.) & DU TOIT (P. J.). **Tropenkrankheiten der Haustiere. Handbuch der Tropenkrankheiten, herausgegeben von Carl Mense. Zweite Auflage, Sechster Band.** [Tropical Diseases of the Domesticated Animals. MENSE's Handbook of Tropical Diseases. 2nd Edition. Vol. VI.]—1921. Leipzig: Johann Ambrosius Barth. pp. 1–889. With 143 text figs. and 4 coloured plates. [Price M. 240—bound, M. 264.]

The first edition of Mense's "Handbuch" was published in the years 1905–6 in three volumes, one of which contained an article of 92 pages by SANDER and HENNIG on Epizootics of the Tropics and Subtropics. The first volume of this, the second edition, was issued in 1913, the second and third volumes in 1914, part of the fourth in 1916, the fifth in 1918, and here we have the sixth entirely devoted to the Tropical Diseases of the Domestic Animals and comprising nearly 900 pages. The inclusion of a veterinary section in a manual of tropical medicine intended for the medical profession is, if not a new departure, at least unusual. The chief reason given by the authors is the prominent part taken by doctors in the investigation of tropical epizootics, so that one may speak of "a common field of work of the two branches of medicine." The need for co-operation, especially in the tropics, between the two branches of the medical profession, using the word to include all practitioners of the healing art, is becoming indeed more widely recognized. Mr. L. E. W. BEVAN has recently written: "The close association and interdependence of our two professions are daily becoming more noticeable, especially in tropical and subtropical countries where the diseases of man and animals are so closely allied," and the Royal Society of Tropical Medicine and Hygiene has recognized this, not only by inviting the co-operation of veterinarians, but by including among the objects of the Society in a recent revision of its Laws the study of the diseases of the "lower animals" in warm climates.

The authors limit themselves to the diseases characteristic of the tropics and subtropics, and have excluded those which are common also in temperate climates. The inaccessibility of articles published during the war outside Germany was naturally a handicap to them, and they express in handsome terms their indebtedness to the publications of this Bureau.

A word about the authorship. Dr. du Toit is a South African who chanced to be in Berlin in 1914 on the outbreak of war and was there detained by *force majeure* till 1918. The volume, for which material had been collected by Dr. Knuth, was completed during this period.

The volume is in two separate parts weighing, unbound, nearly 3 lb. apiece. The matter is divided into the following Sections—protozoal diseases (in which are included the spirochaetoses and 50 pages on the ticks), diseases caused by ultravisible viruses, by bacteria, by mycoses, by worms and insects, by vegetable poisons, and lastly, diseases of unknown origin. The first Section occupies 587 pages of the total 865 of text.

The trypanosome diseases, or Trypanosomoses as they are called, occupy the first 270 pages, and one recognizes the justice of the phrase "common field of work," for a large proportion of the names cited are those of workers trained in human pathology. The scope of this article is limited because the blood protozoa are being dealt with from a general standpoint in another volume (not yet issued), and the subject of transmission was treated in the first but, as the authors admit, inadequately. An Introduction, in which the subjects of identification and classification are discussed and a useful table of all the known mammalian trypanosomes classed in ten groups (eight pathogenic) is comprised with many useful details, is followed by a series of chapters in which the trypanosome diseases of domestic animals are taken up in turn. A full list of references is appended to each chapter, how full may be judged from the fact that the literature of Surra occupies 9½, that of Nagana 23 pages. The diseases caused by *T. dimorphon* and *T. congolense*, though treated in different chapters, are regarded as identical. After a chapter on *T. ingens* and its congeners we reach one entitled, the trypanosomes found in African big game, which will be of special interest to the medical man. This contains a series of tables illustrating the findings of DUKE, KINGHORN and YORKE, BRUCE and colleagues, TAUTE, and WECK, in various regions of tropical Africa, and two comprehensive tables, one showing the 26 species of wild animal—15 are antelopes—which have been found positive by the respective observers and the other the species of trypanosome, as far as it can be ascertained, in each case. The tables seem to have been drawn up with much care and should prove very useful for reference. The next chapter treats, as clearly as this much contested subject admits, the significance of big game and domestic animals in the spread of sleeping sickness. As regards both the *gambiense* and the *rhodesiense* varieties this is held to be less than some authorities claim. The authors do not always commit themselves to a definite opinion. They set down the various observations or views and leave decision to the reader. For instance, the trypanosome classification of CHALMERS is given in outline with the bare comment:—The future will show whether this will be accepted.

Leishmaniasis, which in veterinary pathology concerns the dog only, occupies 18 pages; it seems improbable that infection passes with any frequency from dog to man, though the parasites are not distinguishable, and the disease appears to be almost confined to the borders of the Mediterranean.

Piroplasmosis, obviously an important group of diseases, occupies 162 pages: infections of each domestic animal are considered in turn. The Section on ticks, which follows, deals with their biology, the way in which they transmit disease, ticks as ecto-parasites, ticks as disease excitants (tick paralysis), and lastly with anti-tick measures, which are discussed at considerable length. Ticks do at least as much damage, the authors note, as skin parasites and blood suckers, as they do in disease transmission; they are responsible for the spread not only of the piroplasmoses but the spirochaetoses of domestic animals and two diseases caused by ultravisible viruses—heart water of ruminants and Nairobi sheep disease.

Short accounts of toxoplasmal, coccidial, and sarcosporidian infections bring us to the Spirochaetoses, which do not seem to be of much importance to domesticated mammals; spirochaetosis of fowls is described fully.

The Diseases caused by Invisible Viruses (122 pp.) described are: horse sickness of Central and South Africa, catarrhal fever of sheep, or blue tongue (South Africa), heart water of cattle, sheep and goats (South Africa), ephemeral fever of cattle (Africa), Nairobi sheep disease, and rinderpest; the last takes 56 pages (including 15 of references).

The Diseases of Bacterial Origin (16 pp.) are Malta fever, the South American peri-articular phlegmon of cattle, muscle abscesses in cattle (Guatemala and Brazil), which the authors suggest is the same condition as that described in man in Africa, infectious foot disease in sheep, goats and cattle (Transvaal and Tanganyika Territory) and paralysis of the ostrich (S. Africa).

The Section on Mycoses (32 pp.) has two sub-headings—epizootic lymphangitis of equines, and sporotrichosis. The authors note that the latter is not peculiar to the tropics, but it is briefly described because it is often confused with epizootic lymphangitis and other conditions.

The Section on Diseases caused by Worms and Insects is unexpectedly brief, comprising only 34 pages. The authors explain that though helminth-caused diseases are very numerous among domesticated animals (they instance the tapeworms and Strongylidae), most are cosmopolitan, and those that are limited to the tropics are among the less harmful and are more interesting to the parasitologist than to the medical man. The conditions they discuss are: filariasis (22 pp.), summer sores or habronemiasis, and myiasis. The filariae are those of the dog, horse, ox and camel, with brief mentions of other animals. The myiases described are those that affect the skin.

The Section dealing with Diseases caused by Poisonous Plants (30 pp.), includes too many headings for mention. It is remarkable that of 16 such disease conditions described, all but four appear to be limited to South Africa. Whether this is due to the activity of Sir Arnold THEILER and his colleagues is uncertain, but such seems the probable solution, for readers of this review cannot fail to notice the extent to which South African diseases figure. Dunsickness or ragwort poisoning, described from South Africa and elsewhere, is of special interest to medical practitioners because it affects men as well as animals [see this *Bulletin*, Vol. 17, pp. 250–1].

The Diseases of Unknown Origin are osteoporosis, or bighead of horses, mules and donkeys, lamziekte, or lamesickness, of cattle, jagziekte of sheep (or chronic catarrhal pneumonia) of South Africa, and other rare conditions. The authors point out in a footnote that lamziekte has been shown by THEILER, du Toit and others, to be due to the ingestion of bones and substances of carcasses undergoing putrefaction which contain an active poison produced by bacteria, and is therefore analogous to botulism.

If one is justified in applying to the whole a conclusion drawn from a part—the reviewer can claim no acquaintance with the diseases unrepresented in human pathology and has not read those Sections—it may be said that much information is accurately set down and, as the book is written in the plainest German style so that anyone who has a moderate acquaintance with that language can read it, it should be of value to British doctors in the tropics who are either interested in disease—especially protozoal—in general, or are far removed from their veterinary confrères. The references form a useful feature and there is a short but serviceable index. The matter is well displayed and printed, but the volumes are so heavy that unbound they quickly disintegrate.

A. G. B.

LANGERON (M.). **Précis de microscopie : technique, expérimentation, diagnostic.** 3rd Edition.—pp. viii + 915. With 293 text figs. 1921. Paris: Masson et Cie., Editeurs, 120, Boulevard Saint-Germain. [Price 34 fr. net.]

All those who know M. Langeron's " Précis de Microscopie " will welcome the third edition of this excellent book, the general arrangement of which is much the same as that of the earlier editions, but with the incorporation of many modifications of technical methods and the addition of a great deal of new matter. The chapters on fixation and fixatives have been rearranged and largely rewritten, as also that on the theory of staining.

The value of this book is due to the fact that it is essentially a *practical* guide. The author is not content merely to enumerate the various technical processes suitable for the preparation of an object for microscopical examination, and to leave the reader to take his choice of them ; he tells us the method that he himself habitually uses, and describes this so clearly that even a beginner can hardly go astray. If, however, in spite of the very precise and detailed directions, the result is not perfectly successful, M. Langeron explains exactly where the mistake lay ; indeed, as the result of his own large experience, he anticipates and prescribes the remedy for likely errors before they occur.

The scope of the book is very comprehensive, and the information given is quite up to date in every respect.

The first section deals very thoroughly with the microscope and its accessories. There is an instructive chapter on the use of the illuminating apparatus, a subject about which some confusion prevails in the minds of a good many microscopists. Optical theory is sufficiently touched upon for those who are not mathematicians. The experiments described, which can be repeated by anyone who owns a microscope, illustrate very well such subjects as diffraction images and those produced by oblique illumination, and explain clearly why objectives of high numerical aperture are necessary for the resolution of fine details of structure, and the advantages of apochromatic lenses for critical work. There is a good chapter on the use of polarized light, and, in another, the subject of dark-ground illumination is very fully dealt with.

In chapter III. the author insists upon the importance, in all classes of work, of the examination of fresh, unstained material. He says, quite rightly, that this is the simplest and oldest method in histology, and adds that it is also the one which has led to the greatest discoveries.

About two hundred pages are devoted to the methods used for the examination and preservation of zoological specimens, with special reference to parasitology. Hence the greater part of this section is concerned with the protozoa, parasitic helminths and arthropods. The author reminds beginners that, in the freshwater fauna, they will find at hand material abundant and varied, the study of which will bring familiarity with the necessary technical methods. Like the rest of the book these chapters are very practical, and the methods described are those in current use by experts in the different groups. Useful directions are given for procuring material, either as it occurs in nature, or by breeding methods in the laboratory.

The chapter on cytological technique contains a good deal of new matter, with references to many recent publications. Here, as throughout the book, due credit is given to the authors of new methods, be they Frenchmen or foreigners.

In the introduction, M. Langeron does homage to the skill of such early workers in microscopy as LEEUWENHOEK, who, as Mr. Clifford DOBELL has recently shewn, was able to see *Giardia intestinalis*, the length of which is usually from 10 μ to 18 μ, with lenses which he had made with his own hands.

With a justifiable patriotic pride, the author is able to state that, as regards instruments, stains, optical and other glassware, France is now able to manufacture everything required for the most exacting microscopical work.

M. Langeron writes so simply and with such good style that even those whose knowledge of the French language is only moderate should be able to read this book without any difficulty. It would, however, be a great boon to many readers if an English translation could be published of this, and of several other volumes (notably M. BRUMPT's "Précis de Parasitologie") in MM. Masson et Cie's "Collection de Précis Medicaux." The reviewer knows of nothing quite corresponding to them in the English language, and certainly of no similar books which are published at so moderate a price.

H. J Walton.

MUIR (Ernest) [M.D., F.R.C.S. (Ed.)]. **Handbook on Leprosy; Its Diagnosis, Treatment and Prevention.**—pp. iv + 118. With 2 coloured plates and 56 figs. 1921. Cuttack: Published by R. J. Grundy. [Price Rs. 7.] [Agents for sale in Great Britain, H. K. Lewis & Co., Ltd. 10*s*. 6*d*. net.]

This little book, though modest in size and unpretentious in appearance, is a model of what a medical handbook should be. The work of the author in applying the new remedies introduced into India through the researches of Sir Leonard ROGERS is already known to readers of the *Tropical Diseases Bulletin* (see Vol. 17, p. 286), and this volume is just what we should have expected from Dr. Muir. Part I is concerned with diagnosis, and is illustrated with excellent photographs depicting all the more common clinical types of the disease. These photographs are of especial value in amplification of the text, where the author treats of differential diagnosis. Fig. 27, illustrating leucoderma, should be compared with Fig. 21 and 22, which show how closely similar may be the depigmentation in leprosy, in leucoderma, and in syphilis. In recording the fact that nerve leprosy is the more common type in endemic areas and nodular in those countries into which the disease has lately been introduced, the interesting suggestion is made that this "is probably on account of a certain amount of immunity being induced in the endemic area . . . while this immunity is wanting in formerly leprosy-free areas." The short description of eye affections in leprosy is particularly valuable in what is, to quote from the preface, "a handbook for the general practitioner in the endemic area."

In turning to Part II, which deals with treatment, we find the author on his chosen subject, and it is here that the wonderful progress of the last few years is made so clearly apparent. The two photographs contrasted in Fig. 32 are of the sort to carry conviction, and records such as these are landmarks in the history of therapeutics. The fruits and seeds of *Gynocardia odorata*, *Taraktogenus Kurzii* and *Hydnocarpus Wightiana*, as well as the leaf and flower of the last of these, are well depicted in a coloured frontispiece, and the trees themselves are shown in excellent photographs in Figs. 35, 36 and 37. The various preparations in use by different workers are discussed, and the author's own preparation, E.C.C.O., is described on page 43. To obtain a mixture sufficiently potent to be of service, one that could be given hypodermically without pain or danger of forming an abscess, and which will remain chemically stable and aseptic over a long period, Dr. Muir prepared the following solution, which, from the initial letters of its constituents, is called E.C.C.O.:

Ethyl esters of the fatty acids from *Hydnocarpus Wightiana*	1 cc.
Pure Creosote	1 cc.
Camphor	1 cc.
Olive oil	1 cc.

" The camphor should be dissolved in the creosote and added, along with the ethyl esters, to the olive oil, which has first been heated for half-an-hour to 96° C. on a water bath and then cooled." The technique for preparing the fatty acids and the ethyl esters of chaulmoogra oil is given on pages 44 and 45. The apparatus used is illustrated in Figs. 39 and 40. But while much space is, naturally, devoted to the new remedies, the author by no means forgets the great importance of general medication and the treatment of intercurrent disease. Ankylostomiasis and malaria must be got rid of where present, the patient must be kept in a cheerful environment and the surroundings must be hygienic if the best results are to be obtained. " It is easy to see that a great deal of harm may be done by the popular idea arising that a specific has been found for leprosy,' for the patient will pin his faith to some drug and neglect to regulate his diet and to observe the other important rules of health, so essential for his recovery."

In Part III, " Isolation and Segregation," Dr. Muir raises many interesting points of epidemiology. Here, once more, we are struck with the close similarity between the modern lines of thought as regards leprosy and tuberculosis. To quote from our author, "As an epidemic of cholera in a community which is not on its guard against infection tends to attack all those who are not naturally immune, and those who suffer either die or, if they recover, are rendered immune by the attack, so leprosy, in a much more slow and insidious way, tends to gradually render the community where it is or has been rife more or less immune." Dr. Muir believes the lepers in India to number from half to one million, of whom a tenth are paupers; say 50,000 pauper lepers at the lowest estimate.

The Asylums available are 92 in number, with 8,850 leper inmates. It is, therefore, clear that a great increase in accommodation is necessary. The author is a strong advocate of the colony system, believing as he does that a normal life and healthy occupation are the first necessities in treatment.

We might add that provision of these essentials is the least that the State can be held to owe to the unfortunate leper patient whom it is necessary to isolate from his healthy fellows in the interests of the community.

The volume closes with valuable suggestions and plans for Leper Colonies, and with a scheme for research, a word used too loosely and, in the particular case under discussion, a bad substitute for the less popular word—investigation.

We cordially recommend this excellent book to all medical men and sanitary officers whose sphere of work lies in the Tropics.

S. Lyle Cummins.

LANKESTER (Arthur) [M.D. (Lond.)]. **Tuberculosis in India; Its Prevalence, Causation, and Prevention.**—317 pp. 1920. Butterworth and Co., Ltd., 6, Hastings Street, Calcutta, and Bell Yard, Temple Bar, London. [Price 7–8 Rs. net.]

This little book records the results of two years' study of tuberculosis in India, carried out for the Research Fund Association of the Government of India, during which nearly all the large cities of India were visited and information was gleaned from the medical men practising in them. It is written for laymen as well as medical men, so contains simple descriptions of the subject as well as a large amount of useful information on the prevalence of the disease in India. The writer thinks tuberculosis has increased in some areas, although reliable statistics are not available to prove it. He quotes observations made in Bengal showing that 8 to 10 per cent. of the mortality in some districts is probably due to phthisis, and a still larger amount in towns, the principal cities showing an annual death-rate of 2 per mille and upwards, while post mortem records for a number of years in Calcutta showed that 17 per cent. of the total deaths were due to pulmonary tuberculosis, and in 8 per cent. more tubercle was found in addition to other diseases ; in Bombay, he found one year's post mortem records showed figures of 35·7 and 9·5 per cent., so there is no doubt that tuberculosis is second to none of the tropical diseases as a cause of mortality in Indian presidency towns, although somewhat less in Madras city, which is far more open and less overcrowded than Bombay and Calcutta, in the worst parts of which the annual death-rate from phthisis is as high as 4 per mille. Somewhat similar figures are given for a number of other large towns ; so the tuberculosis problem is a very serious one in Indian cities, which this work should prove of value in making known. A high incidence among Indian Christians and among the " Anglo-Indian " (new style) community is also pointed out, and a terrible prevalence of the disease in certain overcrowded philanthropic institutions, especially orphanages, is clearly brought out, both the children and the staff suffering greatly.

The controversial and difficult subject of immunity and susceptibility is discussed, and the view is taken that the greatest danger of serious and fatal infections is during the first three years of life, after which infections are common, but are less serious and tend to be recovered from with resulting immunity to further infection ; and in support of this theory the remarkable statement is made that the disappearance of leprosy from Western Europe in the middle ages was apparently due to the gradual immunization of the whole population, although no evidence is brought forward in proof of this very unorthodox opinion.

The interesting and important question of the rarity of bovine tuberculosis in India and its relationship to the prevalence of surgical tuberculosis is dealt with in two chapters, which confirm the well-known rarity of the infection of cattle in India, due apparently to the open-air life they lead in most parts, but figures and opinions are brought forward to show that the comparitive rarity of surgical forms of tuberculosis in the human subject shown in Bengal some years ago does not hold for the North-Western portions of India, especially where, owing to the long cold season, the population lead a less open-air life. As the great infrequency of infection of the milk in India and the almost universal custom of boiling it before consumption practically exclude bovine infections, it is clear that the frequent gland and bone tubercle in parts of the country must be almost, if not entirely, due to the human type of tubercle bacillus, which is believed to gain access through infected dust derived from the expectoration of phthisical patients.

The predisposing causes of the disease are next fully discussed and the influence of social factors in favouring the disease are clearly brought out, especially poverty and overcrowding ; the seclusion of women, accounting for the much greater prevalence of the disease among them, and especially Mohammedan females ; the debilitating effects of early marriage and child-bearing, aggravated by the barbarous conditions under which delivery commonly takes place, leading to the frequent outbreak of phthisis shortly after that event ; sleeping with the head covered up ; overcrowding in certain schools, etc.

The third section of the book deals with the Prevention of Tuberculosis in India. The difficulty in dealing with such a widespread disease dependent so largely on social customs, which can only be very slowly altered, is insisted on, and educational propaganda, which will take long to produce much effect, is advised as the most hopeful means of bringing about improvement. The author is rightly cautious regarding the possibility of effecting much in the treatment of early cases in expensive sanatoria in such a poor country as India, but he points out that in several of the large cities, including Calcutta, wards have been provided for the isolation and treatment of advanced open cases, the removal of which from overcrowded houses is so important in checking further infections, but funds are not available to enable them to be opened ; the provision of wards to be called after the donors unfortunately appealing much more to philanthropic Indians than the no less important provision of funds for

their upkeep, although there are not wanting signs of increased interest in social and medical problems in India which promise well for the future.

This little book should prove of great value in stimulating and guiding into right channels efforts for the amelioration of the insanitary conditions underlying the terribly widespread incidence of tuberculosis in India, and other backward tropical countries.

Leonard Rogers.

We have to deplore the death of Sir Patrick MANSON, on April 9th. Sir Patrick was an original member of the Managing Committee of the Sleeping Sickness Bureau, founded in 1908, and of the Tropical Diseases Bureau which developed from it in 1912, and took the greatest interest in the work of each institution.

TROPICAL DISEASES BUREAU.

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RECENT PROGRESS IN MEDICAL ZOOLOGY.—PART II.

By Lt.-Col. A. ALCOCK, C.I.E., M.B., LL.D., F.R.S., I.M.S. (retd.).
Assistant Director, Tropical Diseases Bureau.

The first part of this review, which appeared in Vol. 18 of the *Bulletin*, dealt exclusively with medical entomology; the present and concluding part takes in several other matters of a combined medical and zoological interest that are not definitely included in other sections of the *Bulletin.*

1. *Protozoon Parasites of the Intestine.*

Recent work on the intestinal protozoa of man has certainly modified our conceptions of the pathological significance of parasites and has also helped to clarify our definitions of the term "tropical disease," since it has very clearly disclosed the facts that certain protozoon parasites—in particular *Entamoeba histolytica*—long supposed to hold a distinctive place in tropical pathology, are neither peculiar to the tropics nor unconditionally pathogenic. The first of these propositions, foreshadowed by SMITH and MATHEWS and other investigators at Liverpool, was soon followed up in other places outside the tropics, and has been fully discussed and brought into prospective by DOBELL in a Special Report to the Medical Research Council. In this report (Vol. 18, p. 33*) a mass of evidence is collected from many sources showing that—quite apart from any question of imported "carriers" from the tropics—infections with *E. histolytica* (as of other intestinal protozoa) are quite common among natives of Great Britain and other countries of Western Europe, who have never had any connexion or communication with foreign parts. The evidence collected in this report shows also that these indigenous infections of temperate countries, though, quite occasionally, they may become manifest in all the typical signs and symptoms of amoebiasis, are usually innocuous and unsuspected, the infected individuals being to all appearance perfectly healthy. We are justified in concluding, therefore, that *Entomoeba histolytica* is a parasite that only becomes pathogenic in certain circumstances. What those circumstances are is a matter of much easy speculation, but it seems sure enough that they concur oftener in than outside of the tropics. DOBELL, it is true, does not approve this simple and logical conclusion, but assumes that *E. histolytica* is always pathogenic in action, though not necessarily to clinical observation. He thus appears to regard the amoeba, when unsuspected and clinically negligible in an apparently normal individual, in the same light that a physician regards a compensated organic lesion—a view decidedly strained. More important than speculations of this sort is the recognition of the danger to a community of these multitudes who are harbouring the amoeba and passing its cysts in their faeces, and of the slur cast upon the sanitary moral of the community by the existence of these individuals in such numbers. Philosophers who descry in the dreadful god of battle the quickening spirit of human progress, may comfortably reflect that all this exact knowledge of the dysentery amoeba was one of the many outcomes of the Great War.

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* References are to summaries in the *Tropical Diseases Bulletin,* unless otherwise stated.

The general study of the intestinal protozoa of man, stimulated by the conditions of active military service, has been greatly helped by WENYON's instructive " Observations " on the subject, published in the *Lancet* of November 27, 1915 (Vol. 7, p. 231). More recently it has been still further facilitated by the work of DOBELL, who, in his latest publication, planned in collaboration with O'CONNOR (Vol. 18, p. 413), has defined and mapped the whole field, clearly described its particular natural features, traced the footsteps of its previous explorers, and marked all its roads and its pitfalls. A clear distinction is here drawn for the first time between the true intestinal fauna, the elements of which are naturally passed in the faeces, and the accidental and delusive fauna of the faex itself—the coprozoic protozoa. The former are inhabitants of the intestine ; the latter, of which four species of Rhizopoda and eight species of Flagellata are considered worthy of notice by DOBELL, either get into the faeces, as they commonly get into organic infusions and decomposing organic matter in general, by reason of their ubiquity, or may be derived from swallowed cysts that have passed through the gut unchanged and have ultimately been hatched in the discharged faeces. Of the protozoa whose proper natural habitat is the human intestine, seventeen species are recognized by DOBELL and O'CONNOR, namely five Amoebae, seven Flagellata, four Coccidia, and three Ciliata, of which two (*Balantidium minutum* and *Nyctotherus faba*) have but seldom been observed. How many of these —beyond *Entamoeba histolytica* and *Balantidium coli*, and perhaps *Giardia intestinalis*—are harmful to man, and how far they are harmful, are much debated questions. DOBELL appears to regard all the Flagellata —even Giardia—as harmless. WENYON (Vol. 16, p. 93), who took advantage of a good opportunity of systematically investigating a good deal of post-mortem material that chanced to be infected with Trichomonas and Chilomastix, did not find any lesions that could be attributed to them, although in one case he observed Trichomonas in the connective tissue between the Lieberkuhnian follicles. As regards the Coccidia, a recent paper by HAUGHWOUT (Vol. 19, p. 105) contains a good account of a case of human coccidiosis and references to other cases ; the symptoms in HAUGHWOUT's case, which was under observation for more than four months, were abdominal discomfort, lassitude, loss of appetite, and occasional nausea and watery diarrhoea, with passage of oocysts and shed epithelial cells. In view of the dogmatic statements so often met with regarding the morbific significance of the intestinal protozoa of man, it does not seem unreasonable to commend to disputants on this subject the following passage from the Leviathan of that sound philosopher, Thomas HOBBES, of Malmesbury :—

> " As in Arithmetique unpractised men must and Professors themselves may often erre and cast up false, so also in any other subject of Reasoning the ablest, most attentive, and most practised men may deceive themselves

and inferre false conclusions. Not but that Reason itselfe is alwayes Right. Reason, as well as Arithmetique is a certain and infallible Art. But no one man's Reason, nor the Reason of any one number of men, makes the certaintie; no more than an account is therefore well cast up because a great many men have unanimously approved it. And therefore, as when there is a controversy in an account, the parties must by their own accord set up for right Reason the Reason of some Arbitrator, or Judge, to whose sentence they will both stand, or their controversie must either come to blowes, or be undecided, for want of a right Reason constituted by Nature, so is it also in all debates of what kind soever. And when men that think themselves wiser than all others clamor and demand right Reason for judge, yet seek no more but that things should be determined by no other men's reason but their own, it is as intolerable in the society of men as it is in play, after trump is turned, to use for trump on every occasion that suite whereof they have most in their hand."

In the first part of this review (Vol. 18, p. 8) reference has been made to the subject of carriage of intestinal protozoa by flies, and to the interesting experiments made by ROOT (*tom. cit.*, p. 16) in confirmation of those of numerous other observers. Other matters worthy of reiteration are O'CONNOR's observations (Vol. 15, p. 206) of many and strange individual inclusions in *Entamoeba coli*, among the inclusions noticed being cysts of *E. histolytica*, Giardia, and Chilomastix, free Giardia, and oocysts of *Isospora hominis*. The same patient observer has also found *Iodamoeba* infesting pigs in Funafuti, and this observation has been so well confirmed in France that CAUCHEMEZ (Vol. 19, p. 25) is inclined to regard this amoeba as being, like *Balantidium coli*, habitually a parasite of the pig. Mention must certainly be repeated of DOBELL's learned paper (Vol. 16, p. 89) proving by several satisfactory lines of argument that the illustrious Antony VAN LEEUWENHOEK (1632–1723) was the original discoverer of parasitic protozoa, he having fully reported (1681) the detection in his own stools, with lenses of his own manufacture, of the "prettily moving animalcules, some rather larger, others somewhat smaller, than a blood corpuscle," now known as *Giardia intestinalis*. A less pleasing topic is discussed in a paper by WENYON (Vol. 19, p. 19), where sufficiently convincing proof is offered that CHATTERJEE's "new" *Entamoeba paradysenteria* is nothing but a name for a degenerate *E. histolytica*, and that the "new" genus and species *Councilmania lafleuri* of KOFOID and SWEZY is none other than *Entamoeba coli*, the extraordinary "budding" of whose cysts is an illusion due to the simple accident of rupture. DOBELL's criticism (Vol. 18, p. 410) of the treatise on the Flagellata of the digestive tract by KOFOID and SWEZY consigns "Craigia" and "Craigiasis" to perdition.

II. *Protozoon Blood-Parasites.*

Some work of unusual significance has recently been published that may help to elucidate the mystery of dormant malaria. First may be mentioned WHITMORE's observations on bird malaria (Vol. 13, p. 65) to the effect that the blood of infected canaries remains infective by injection for at least 29 months after parasites have ceased to be discoverable in the circulation—29 months being no fixed limit, but merely the limit of the author's opportunities of experiment. Etienne SERGENT (Vol. 17, p. 101) has confirmed this fact of persistent infectivity after disappearance (or at least occultation) of parasites, while increasing its practical significance, by demonstrating that the birds' blood in these circumstances is infective to Culex—a revolutionary discovery. In another direction J. D. THOMSON (Vol. 11, p. 1) has cleared away SCHAUDINN's misleading hypothesis of parthenogenesis of the Plasmodium gametocyte by a convincing demonstration that the supposed schizogametocyte is merely an instance of that not very rare phenomenon—a schizont and a gametocyte intimately enclosed in the same red blood corpuscle. THOMSON strengthens his case—if repeated demonstration of simple fact require support—by the very apt argument that as parthenogenesis, by universal acceptance, can only imply that a virgin ovum completes a predetermined course of evolution exactly as if it were a fertilized ovum, the progeny of a Plasmodium macrogamete must, under any supposed circumstances, be a swarm of sporozoites, not a mass of young trophozoites.

GILL (Vol. 18, p. 328) has published some suggestive observations on the combined influence of moisture and temperature on the development of malaria parasites in mosquitoes. The experiments of MITZMAIN and of WENYON on the history of malaria parasites in hibernating mosquitoes, and those of MAYER and MÜHLENS on instances of generalized sporozoite-infection in Culex and Anopheles have been noticed in the first part of this review (Vol. 18, p. 3).

The antecedent origins of blood-parasites is a subject so fascinating and seductive that no one should write about it without having some halfpenny-worth of fact to set against his liquid speculation. That a given blood-parasite may have had somewhere some antecedence in an intestinal parasite is a reasonable hypothesis, but REICHENOW (Vol. 17, p. 98) appears to think that he has found evidence of a specific intestinal Trichomonad of lizards spreading freely from the intestine to the tissues and the blood of its host and subsequently being transferred from the blood of one individual host to the gut of another by the mediation of a mite. This seems to be an unnecessarily devious path for the evolutionary change from intestinal parasite to blood parasite. That parasites whose ordinary habitat is the intestine (or whose mode of entry is by the intestinal tract) can get into the tissues and the blood stream, and that parasites whose ordinary habitat is the blood can get into the tissues is, of course, nothing unfamiliar.

A good many papers have appeared within the last few years on the flagellates of plants—chiefly Euphorbias, but also an Asclepiad—with suggestions that this may be a natural source of insect infection. LAVERAN and FRANCHINI (Vol. 18, p. 187) claim to have also infected white mice with latex of a Euphorbia naturally infected with Leptomonas and to have subsequently found leishmaniform parasites in the blood of the mice that survived the experiment. On the other hand, FRANÇA (Vol. 17, p. 100) did not succeed in infecting laboratory animals direct from latex infected with Leptomonas.

As regards modes in which a given infection may be spread, it has been stated that certain species of Trypanosomes can find their way into the milk of their mammalian host, and LANFRANCHI has recorded (Vol. 17, p. 335) the results of a series of experiments from which he concludes that it is possible for sucklings thus to get infected from their mother. Several papers have been published on the question of the natural mode of transmission of Sarcosporidia, and attention may again be directed to SERGENT's suggestion (Vol. 19, p. 108) of the intermediation of a blood-sucking arthropod, this suggestion arising out of the discovery of a number of spores resembling those of *Sarcocystis blanchardi* in the peripheral blood of a calf, the spores being of two kinds, suggestive of a sexual difference. Another mode of transmission of sporozoan parasites is conjectured by GUYENOT and NAVILLE (Vol. 17, p. 102); in the stomach of grass snakes, which were infected as to their dorsal muscles with small white tubules stuffed with sporoblasts and spores, they found trematodes similarly infested, the ovaries of the trematodes being suggestively involved in the spore infection.

A minor matter worthy of mention is the discovery by SWELLENGREBEL (Vol. 18, p. 195) of a Haplosporidian parasite in the stomach of *Anopheles indefinitus*, since misleading cysts of a very similar parasite occur in *Anopheles maculipennis*.

III. *Snake-bite and Snake-venom.*

In this subject the masterly essay by Hugh ACTON and R. KNOWLES, published in the *Indian Journal of Medical Research* for July 1914 and October 1915, under the title "Studies on the Treatment of Snake-bite" (Vol. 9, p. 237) will undoubtedly rank as a classic, both from the scientific and from the utilitarian standpoint. Based on intelligent experiment, concise and coherent in argument, and luminous in its practical applications, it is a model of critical research. It begins with an analysis of all the terms involved in the proposition "Effective bite from a venomous (Indian) snake," namely, the mechanism of the given bite, the potency of the specific venom, the estimate of the minimum lethal dose of that venom for man, and the estimate of the number of doses discharged in an effective bite. Thus we start—perhaps for the first time—with some clear definitions indispensable for prognosis. Mechanical treatment is next considered—ligature and amputation, besides other questionable methods—and from ample experiment it is shown that an efficient ligature, applied immediately, may save life, particularly in cases of viper bite, and at any rate gives time for the operation of other remedies. The value of local remedies is then discussed—permanganates, gold chloride, and iodine chloride—and the authors' experiments show that if these can be injected hypodermically in the vicinity of the bite (10 cc. of a 5 per cent. solution of gold chloride being the most effective) before a lethal dose of venom has been absorbed, life can be saved. Thus a monkey recovered, which, after receiving 25 lethal doses of cobra venom, had been adequately ligatured within three minutes and locally injected with 10 cc. of 5 per cent. gold chloride solution when the ligature was removed twenty minutes afterwards. The nature and action of venoms and antivenoms, and the aspects of anti-venene therapy are then considered, and finally the essence of this comprehensive and connected series of experiments is distilled for practical every-day use.

Of papers of a more purely scientific interest those of HOUSSAY, NEGRETTE and SORDELLI (Vol. 16, p. 116) embody the results of a remarkable amount of experimental work on the chemical and physiological action of the venom of numerous notorious American, Asian, and Australian snakes, including *Lachesis, Ancistrodon, Crotalus, Elaps, Naja, Bungarus, Vipera, Echis, Notechis,* and *Pseudechis.* Among other things the diastatic, amylolytic, lipolytic, lecithinasic, and proteolytic action of these venoms, has been studied, and their specific action on the blood in vitro and in vivo. As regards the action on the blood, these authors distinguish between coagulant and anticoagulant venoms. The coagulant venoms clot the blood, immediately or gradually according to the dose injected, the clotting being directly due to precipitation of fibrinogen; this is their "positive phase," which is succeeded, quickly or gradually according to dose, by a "negative phase," when, as a consequence of the complete precipitation of its fibrinogen the blood becomes incoagulable. The anticoagulant venoms impede coagulation (unless they also contain specific thrombine, which masks this action) not by formation of antithrombin or by any interference with fibrinogen, but by direct destruction of cytozyme.

Another interesting contribution to our knowledge of snake venom is contained in a paper by GUNN and HEATHCOTE (Vol. 18, p. 31) on Cellular Immunity. It is there shown by experiments in which the heart-muscle and intestine of warm-blooded animals are selected for observation, that "immunity" to cobra venom, both natural and as acquired by antitoxin, is to be considered as in part a cellular immunity of tissues.

IV. *Other Animal Venoms.*

The toxin of the well-known Indo-Pacific Siluroid Fish, *Plotosus anguillaris*, has been located by KABESHIMA (Vol. 16, p. 120) in cutaneous cysts at the base of the great defensive spines of the dorsal and pectoral fins [these cysts are probably temporary dilations of the ordinary mucous glands of the skin] EVANS (*tom. cit.*, p. 121) describes the venom glands of the dorsal spines of the piked dogfish. MATSUSAJI and KABEDA (*tom. cit.*, p. 119) deal in much detail with the action and reactions of the cutaneous venom of the salamander, *Triton pyrrhogaster*. ALLEN (Vol. 18, p. 208) has given an interesting account of the effects of contact with an unspecified "jellyfish": the local effects were intolerable irritation of the skin, followed by profuse weeping eczema, and the generalized effects were manifested immediately in severe coryza succeeded by acute and persistent inflammation localized in the larynx.

NAKANO (Vol. 13, p. 381) has recorded some investigations of the poisonous properties of a crab and lobster not precisely specified; he found that the filtrate of an emulsion of the liver—both of the raw and of the boiled liver—was poisonous to mice, although heating of the filtrate itself rendered it harmless. ISHIHARA (Vol. 16, p. 120) describes some chemical reactions of the poisonous flesh of a parrot fish (Tetrodon).

V. *Miscellanea.*

ROUBAUD'S enthusiastic advocacy (Vol. 16, p. 103) of domestic animals as the ideal preventive of malaria in places where the insect-host of the parasite is *Anopheles maculipennis* may be mentioned here. According to ROUBAUD this insect, if it have free and frequent access to cattle, will have nothing to do with man; given a perfectly free and equal choice between cattle and man, it will not touch the nobler animal. ROUBAUD has now carried his argument to such an extremity of precision that among insects of this species he claims to distinguish, by the number of the minute maxillary serrations, those that are man-eaters from those that are cattle-eaters; so far as his observations go at present the number of serrations in the former is 13 to 14, in the latter 14 to 14·9. He even proposes that in places where, owing to insufficiency or to imperfect distribution of cattle, the local race of *Anopheles maculipennis* is not properly modified for an exclusive diet of cattle, the question of introducing a stock of insects possessing the necessary modification might be considered with a view to accelerating the general modification. Even if the facts supported the conclusions the conclusions would not justify the proposal.

MALARIA.

Wenyon (C. M.). **The Incidence and Aetiology of Malaria in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1921. Sept. Oct. Nov. Vol. 37. Nos. 3, 4 and 5. pp. 172–192. With 2 charts and 9 figs.; 264–277; 352–365. With 5 plates and 2 text figs.

In the first part of this paper (this *Bulletin*, Vol. 18, p. 326) it was shown that the main malaria carriers in Macedonia are *Anopheles maculipennis* for the valleys and *A. superpictus* for the hills. In both species hibernation is, at least mainly, by large, healthy, corpulent females with undeveloped ovaries. Their favourite shelter is a barn with a buffalo combining the functions of central heater and food purveyor, for hibernation is usually relative only. Certainly if the temperature fall very low the mosquito becomes entirely inactive, but if the buffalo function adequately as a stove, anything up to 40 per cent. of the mosquitoes accept it, or any human being entering the byre, as a food purveyor, and avail themselves of any sunny weather for an outing. After vernal oviposition, and in equally suitable conditions, parasitic maturity is reached sooner in *A. maculipennis* than in *A. superpictus*, while in nature the normal habitat of the former in the warmer valleys increases this disparity; so that valley malaria appears earlier in the year than does hill malaria. Among wild mosquitoes dissected during the winter months, 7 contained gastric oocysts. Experiments were accordingly initiated to test the possibility of winter hibernation of malarial parasites in Anopheles. Of 4 *A. maculipennis* and 20 *A. superpictus* fed on two crescent carriers, all of the former and 15 of the latter became infected. If, however, infected mosquitoes were placed in an ice chest at a temperature between 9° and 12° C., oocysts already formed degenerated in every case. If, however, the temperature were only lowered to that of the laboratory, development ceased, only to be resumed a fortnight later when the mosquitoes were placed in the incubator. These conclusions were, of course, reached by sacrificing a proportion of the mosquitoes in question, and indicate that under certain conditions the carriage of malaria through the winter by the mosquito is a possibility.

The malarial parasites found in Macedonia conform to the normal appearance, so that the unusual virulence of malaria there is not attributable to any unusual species. Wenyon's explanation of this has been dealt with in the critical summary (this *Bulletin*, Vol. 19, p. 93 *et seq.*), as has his opinion that there is no justification for Schaudinn's teaching of gametocytic parthenogenesis, and that the schizont of *Plasmodium vivax* is more quinine-resistant than that of *P. falciparum*, so that *P. vivax* survives in outstanding degree in the individual over the winter and so gives rise to the spring epidemic of benign tertian malaria, but that the gametocytes of *P. vivax* are emasculated by quinine, so that they cannot infect mosquitoes.

As an instance of the possible latency of malaria is adduced the case of a man who had his first attack six months after reaching England, and winter malaria is explained by latent infestations first evidencing themselves at that season.

As Wenyon points out, the various factors already mentioned co-ordinate themselves into an explanation of the seasonal incidence of the malarias more reasonable than the unzoological suggestion that mutability of species occurs. Owing to the resistance to quinine of the asexual phase of the benign tertian parasite, and the general cessation of quinine ingestion during the winter months, the year starts, north of the equator, with many more carriers of *P. vivax* than of *P. falciparum*, and mosquitoes become correspondingly infected. As symptoms appear and quinine is consumed, the gametocytes of *P. vivax* are rendered impotent while those of *P. falciparum* are not. Then, too, the gametocytes of the latter are apt, in heavy infections, to be much more numerous than those of the former, so that, as the year passes, mosquitoes become steadily more highly infected with malignant tertian malaria and transmit it to man in increasing degree, and by autumn it is the prevalent infestation. This suggestion of Wenyon's regarding the seasonable prevalence of malaria in those taking quinine will require correlation with Greig ANDERSON's (p. 295) observation on the tertian parasite's seasonal resistance to quinine.

In blackwater fever malarial parasites were common, and quinine was given in all such cases. The mechanism of these cases is looked upon as involving the same method of blood destruction as occurs in malarial fever, but in exaggerated degree, their severe symptoms being attributed to the excess of free haemoglobin poisoning the body in general, and damaging the kidneys in particular as these attempt to excrete it. It is suggested that quinine haemoglobinuria should be distinguishable from blackwater fever.

It is felt that intramuscular injections of quinine have their place in treatment, since, in spite of the fact that they invariably produce necrosis, one or two such injections will constantly induce oral quinine to act in cases in which it has hitherto failed to do so.

In face of our tendency to national belittlement it is well pointed out that from January to June, 1918, the British mortality in Macedonia from malaria was 0·7 per thousand, while over the same period that of the French was 6·4, a fact attributed to the thorough diagnosis and treatment rendered possible by the size of the medical and nursing staffs at our disposal.

Interesting facts are adduced regarding the optimum definitive hosts of *P. vivax* and *P. falciparum*. In *A. superpictus* these two malarial parasites developed at about the same rate. In *A. maculipennis P. vivax* develops as rapidly as it does in *A. superpictus*, while *P. falciparum* takes about a third longer; from which it may be inferred that *A. superpictus* is a more nearly optimum host for *P. falciparum* than is *A. maculipennis*.

Finally, there are valuable practical hints for the dissection of mosquitoes and the staining of malarial parasites during their varied development in their hosts. The findings confirm in the main those of GRASSI. Certain acicular crystals, soluble slowly in water and instantly in acid, were seen several times in salivary glands. They so closely resemble sporozoits that the possibility of error must be emphasized.

Clayton Lane.

FERGUSON (Eustace W.). **Malaria in Palestine: Experiences with a Field Laboratory.**—*Australasian Med. Congress, Trans. of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug. 1920.* pp. 310–317.

In 12,585 slides examined in thin smears from suspects, 3,788, or 30·09 per cent., were positive. Of these, 2,547 showed malignant tertian, 1,225 benign tertian, and 16 quartan parasites. The maximum time given to a slide was four minutes, and since no double infections occur in this series, although it is noted that such were not uncommon, it may be presumed that examination ceased as soon as any kind of parasite was observed. Between six diagnosis stations, two military laboratories and the Anzac Field Laboratory, 110,000 films were examined, of which 24,000 were found positive, 14,000 being malignant and 10,000 benign infections. The parasites are described in detail.

C. L.

SERGENT (Edmond) & SERGENT (Etienne). **Etudes épidémiologiques et prophylactiques du paludisme (dix-septième, dix-huitième, et dix-neuvième campagnes en Algérie, en 1918, 1919 et 1920.)** —*Ann. Inst. Pasteur.* . 1921. Nov. Vol. 35. No. 11. pp. 801–813.

This report has a value mainly local. The following, perhaps, are the facts of more general interest. There was no observed effect on malarial incidence in those places where bats, feeders on mosquitoes, were present. The ordinary flight range of Anopheles was 1,500 to 2,000 metres, but exceptionally reached several kilometres ; vertically they could rise 185 metres ; they were transported by trains ; a temperature of —10° C., continued for five months, killed their eggs. Enlarged spleen was commoner in adults than in children, in the proportion of 3–2. Prophylactic quinine was given daily in doses of 6 gr., or every other day in doses of 8. An apposite note points out the limits of value of ROUBAUD's animal-house prophylaxis. An unhappy horse was literally covered with mosquito bites one night, but this did not prevent the delivery of a simultaneous and furious attack upon the writers' mosquito nets. Similarly, the inhabitants suffer from malaria although they surround their dwellings with animal-houses to ward off, not mosquitoes, but robbers. Although the writers are satisfied that *Anopheles maculipennis* and *A. bifurcatus* var. *algeriensis* prefer pig to man, these pests show, if starving, no nice fastidiousness ; while in a Mohammedan country there is the usual difficulty with the domestication of the pig.

C. L.

FALLERONI (Domenico). **La malaria di Trinitapoli (Foggia) e l'importanza degli animali domestici nella difesa contro la malaria.** [Malaria in Trinitapoli (Foggia) and the Importance of Domestic Animals in its Prevention.]—Reprinted from *L' Igiene Moderna.* 1921. July, Aug. & Sept. Vol. 14. Nos. 7, 8 & 9. 34 pp. With 3 folding plans.

This paper deals with the medical history and topography of Trinitapoli, the experimental malarial station of Italy, but, as its title hints, its main prepossession is a natural enough claim to national priority in the matter of the value of animal-houses as protective agents against human malaria. It is postulated that for the abolition of this disease there must be that agricultural and hygienic reclamation and betterment which the Italians style "bonifica," and that an essential part of agricultural bonifica is the establishment of animal-houses. It has long been known, it is pointed out, that *Anopheles maculipennis* feeds freely on domestic animals, probably indeed preferring them to man, and figures are given of large catches of Anopheles in stables, which are, however, unchecked by numbers of corresponding catches from dwellings. That this Anopheline habit can be used to protect man from bites, as now urged by ROUBAUD [under certain definite conditions only], was first insisted upon by BONSERFIZI in 1903 and again in 1905, in the Italian Province of Mantova. He, it is held, probed the matter to the bottom. He wrote then that the Province of Mantova contained much stagnant water and many Anopheles; was a very fertile and progressive region, with a healthy population having a mortality of 20 per thousand; had many Anopheles in its stables, few in its houses, the stables being heavily stocked with domestic animals; but had certain heavily infected houses, these being unprovided with stables. BONSERVIZI looked upon domestic animals as exercising an important function in the prophylaxis of malaria by providing mosquitoes with food in place of man. [There seems then no question of the priority of BONSERVIZI's opinions on this matter, which fact, however, in view of the absence for so many years of any reference in Italian literature to this aspect of prophylaxis, does not appear to affect the importance and originality of ROUBAUD's present day advocacy of this prophylactic measure and of the details which he considers essential for success.]

C. L.

SERGENT (Edmond & Etienne), PARROT (L.) & DONATIEN (A.). **Le paludisme en Corse. Etude épidémiologique.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 685–710. With 2 figs.

MARCHOUX (E.). **Le paludisme en Corse y est fonction de la misère.**—*Ibid.* pp. 654–658.

SERGENT (Edm. & Et.). **Les facteurs sociaux de la décroissance du paludisme.**—*Ibid.* pp. 658–662. With 2 text figs.

ROUBAUD (E.). **Le bien-être dans le paludisme et les maladies à trypanosomes.**—*Ibid.* pp. 662–665.

ABBATUCCI (S.). **Le paludisme dans ses rapports avec la situation économique de la Corse.**—*Ibid.* 1922. Jan. 11. Vol. 15. No. 1. pp. 92–98.

These papers all deal with malaria in Corsica. The first is the report of a Commission which investigated the matter in the autumn of 1921, when malaria was at its height, and which dealt mainly with the unhealthy eastern coastal plain. This alluvial plain, reaching a maximum height of 20 metres, is mainly uncultivated, often marshy, covered with scrub, intersected with century-old irrigation or drainage canals in a ruinous state, with soil deficient in lime and phosphates, and is intensely malarial, the splenic index being 39·9, as against 4·8 on the adjacent hills, and the plasmodial index 23·4, as against 1·6, while the percentage of *Anopheles maculipennis* with infected salivary glands is 1·2. The malarial species were present in the following proportions: *Plasmodium praecox* [*falciparum*] 86, *P. vivax* 36, *P. malariae* 14, mixed infections 2. [The fact that eosinophilia occurred in nearly one-third of the cases clearly demands future investigation and some caution in the drawing of conclusions, since all the facts are evidently not before us.] Anopheles breed universally, except in the brackish lagoons to which, however, popular opinion attributes the malaria, but particularly in the marshes which have formed behind the bars at the mouths of the rivers, and in the disused canals. It may be added that the figures in the Tables should be checked before being quoted.

Such being the facts, the other communications deal with their effects on the population and the means by which amelioration is likely to be obtained. Marchoux's view is this:—The country is administered by a prefect whose aim is to get out of it as soon as possible, and served by a monopolistic steamship company whose apparent object is to get out of it as much as possible, and whose heavy freights render prohibitive many essential imports, particularly coal and manures, without which the country cannot subsist. To supply the lack of coal the forests have been largely felled, while deforestation has been increased by fires. This denudation of the country has resulted in a lessened rainfall. When rain does fall it reaches the streams at once and is gone. The watercourses consist, between showers, of a series of pools in the hills, while the coastal marshes are ever present; both provide unrivalled anopheline breeding grounds. Malaria is so severe in the eastern coastal plain that it is mainly uninhabited, at least at night, and the soil itself has become so poor and so dry that what used to be named the golden fields are now practically uncultivated. Indeed, if the peasant put down seed corn, he regrets later that he did not instead eat it, since the crop is not worth cutting. Cattle have disappeared for want of fodder. Sheep and goats exist precariously at the expense of the diminishing forests. The inhabitants are so put to it for manure that one of the standard subjects of discussion is the relative value of the small quantity which their chickens and rabbits respectively produce. The economic situation is summed up in two phrases. Corsicans are accused of slackness in not putting their house in order; as well expect a man to uproot the Eiffel Tower with his bare hands. The country dies of thirst, its inhabitants of hunger. Sympathetic administration, reafforestation, state-aided importation of coal and manure are essential for recovery.

The brothers Sergent draw a useful parallel between the hinterland of Algiers in past years and the eastern coastal Corsican plain at present. In 1830 the barren plain of the Mitidja was practically uninhabited, the entire population of certain villages having been wiped out more than once. In 1841 the only parts of the colony functioning efficiently were the prosperous cemeteries. Then the plain began to be divested of the scrub which at that time covered it (as it now covers the eastern Corsican plain), until it has become a mosaic of intensive cultivation without a spare blade of grass on its fertile soil, and with malaria banished where cultivation is fully intensive. There are still as many larvae of *Anopheles maculipennis* to be found about Algiers as in the most malarious parts of Salonica, Algeria, Corsica, Vendée, and indeed, in the Bois de Boulogne in Paris; so this can hardly be the essential factor. Animal-houses are referred to as a possible partial explanation, but it is held that the good influence of intensive cultivation is less direct, being the result of prosperity, with its accompanying good food, clothing, housing and medication. The best formula for combating malaria on a large scale is held to be "Get rich." The lesson for Corsica is that little improvement can be expected until the well-being of the inhabitants is bettered, and this can only be effected by the improvement of the soil.

ROUBAUD, too, emphasizes the importance of general well-being in holding in check the symptoms of malaria, even if disinfestation be not thereby attained. He illustrates his point by reference to certain races of cattle in French West Africa, which, although in the tsetse zone and infected with trypanosomes, flourish so long as they are not worked and have sufficient water. If these conditions fail, they die. He nevertheless held that his often expressed views can be applied to Corsica with benefit. If the best results are to be obtained, it is, he maintains, necessary to encourage to the full the natural preference of *A. maculipennis* for animals by supplying them with comfortable conditions for obtaining and digesting the blood of these creatures [this *Bulletin*, Vol. 18, p. 329]. He believes that under these conditions a generation of mosquitoes will arise which knows not Joseph, and if at the same time mosquitoes have been, by antilarval and other measures, so reduced that the supply of domestic animals suffices for their needs they will leave man alone; otherwise they emphatically will not. It will be remembered that WESENBERG-LUND [Vol. 18, p. 99] holds that it is by the unintentional application of just such conditions that Denmark has, in the course of years, been freed from malaria.

ABBATUCCI enforces the conclusions reached above. He adds the historical information that while the exiled Seneca had reason to bewail his miseries on insalubrious Corsica, the Eastern coastal plain of this island had, by the second century, reached, under the Roman administration, its golden age, the result of drainage, irrigation and cultivation. When Rome fell, and Genoese, Turks, pirates and English disputed for possession of the land, agriculture ceased and ill-health reasserted itself. We English, again, by the defeat of the great Napoleon, interrupted his schemes, poorly carried out by his lieutenants, for the betterment of his native country. Regarding the reforms referred to by MARCHOUX, freights have recently been halved and the French Government has promised to revise the agreement with the steamship company. The others still require to be pressed.

C. L.

JAARVERSLAG DER MALARIA-COMMISSIE VOOR NOORDHOLLAND OVER 1920. [ALDERSHOFF (H.), Chairman. KORTEWEG (P. C.), Secretary.]—Reprinted from *Verslagen en Meded. Betreffende de Volksgezondheid.* 1921. No. 3. 23 pp.

Malaria has been so troublesome in North Holland as to justify the appointment towards the end of 1919 of a Commission to investigate and control it. Its work for 1920 is here reported. The incidence of malaria is estimated in two ways. The first rests on the diagnosis, apparently clinical, of medical men in practice. In Nieuwendam, for example, a practice covering about 3,000 persons gave 709 malarial cases, of which 485 were considered as primary, giving an incidence during the year of 16 per cent. Similarly, in Zaandam, a practice of 1,700 persons gave a morbidity of 152 cases regarded as new, or 9 per cent. The second method of estimation was by blood smears, taken, apparently, not promiscuously but from persons suspected. In Haarlem, HAVELAAR found 28 out of 116 infected; while at Amsterdam N. H. SWELLENGREBEL and KORTEWEG found plasmodia in 287 out of 643 persons examined. With the exception of 5 quartan, all appear to have been benign tertian cases. There was no mortality.

The mosquito concerned was, one gathers; *Anopheles maculipennis* living domestically, although it has, in Holland, been found living "wild" as far as 3 km. from the nearest stable. *A. bifurcatus* is rare, and is not domesticated, so that, although a proved host of the malarial parasite, it is not implicated in this epidemic. The imagines of *A. maculipennis* were found mainly in stables and, in descending order, in byres, kennels, rabbit-hutches, goat-stalls, and hen-houses, as many as 6,500 having been found in one day (February 21) in one stable. The methods of collection are twofold. In one a pan of water containing petroleum-soaked wadding is held under the rafter on which the mosquito sits, and she, overcome by the fumes, falls into the water. In the other a vacuum syringe is used, with draught so regulated as to be strong enough to suck in the mosquito as she rises from the cobwebs, but not strong enough to lift bits of straw. Mosquitoes so collected, particularly with the syringe, were suitable not merely for enumeration but for identification of species. Of 2,309 Anopheles collected from malarial houses, 0·7 per cent. were infected in the summer and 7·0 per cent. in November. It was always easier to find them in stables than in houses. Larvae were detected, mainly in canals and ditches, from May to October, but especially during August and September. The first male, indicating the new brood, was caught at the end of May. The Commission finds that, in the conditions prevailing in North Holland, sticklebacks prefer daphnae to anopheles larvae.

In prophylaxis, under prevailing conditions, larvicidal measures hold no practical hope of success. Gauze protection for houses is advocated and the destruction of imagines by petroleum or the vacuum syringe. The investigation continues.

C. L.

EISENDRATH (B.). **Malariastations.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Sept. 24. 65th Year. (2nd Half.) No. 13. pp. 1531–1540.

After referring to the malarial history of Northern Holland, and in particular to the coastal epidemic of 1826–27, which virtually decimated the provinces of Friesland and Groningen, the writer draws up a programme indicating the best means of combating the epidemic which attacked the province of North Holland [West of the Zuider Zee] last year. The usual measures are to be carried out through a series of malaria stations, each serving a population of about 50,000 souls. He was gratified to find, when he had to visit Emden as a reserve officer during the war, that they had there in force the [somewhat obvious] measures which he had himself advocated. Simultaneously, their malaria cases fell from 9 per cent. in 1918 to 0·9 per cent. in 1920. As he remarks in English :—" The proof of the pudding is the eating of it."

C. L.

RUSS (Viktor) with others. **Studien ueber die Malaria in Niederösterreich.** [Malaria in Lower Austria.]—*Veröffentlichungen des Volksgesundheitsamtes im Bundesministerium für soziale Verwaltung*: XIV. 1921. 39 pp. [Wien. 1921.] With 1 map and 2 charts in text.

The Great War flooded Austria with men infected by malaria mainly in Italy, including Sardinia, and in Albania. At the same time, investigations showed that *Anopheles maculipennis* and *A. bifurcatus* are practically ubiquitous except in hilly portions of the country. Yet the number of undoubted autochthonous malarial cases reported from Lower Austria appears to be 6 only. Of 543 cases from the

Central Malarial Hospitals, of which details are given, exactly one-third were actually demonstrated to have mixed infections, 6 of them harbouring all three forms of parasite, while of 740 cases mentioned elsewhere 571 were benign tertian infections mostly occurring in the spring and winter, and 5 were quartan infections.

GLÄSSNER and MÜLLERN found quinine, in doses of at least 30 gr. daily, satisfactory in fresh infections; KOCH's method of administration good; those of NOCHT and TEICHMANN unsatisfactory; intravenous and intramuscular injections excellent in comatose cases, but giving no permanent cure [*cf.* ACTON, this *Bulletin*, Vol. 18, p. 335]; methylene blue in half-gramme doses good for quartan infections; neosalvarsan, methodically used, of temporary value, and very suitable for blackwater fever; and provocative methods of at least doubtful therapeutic value. There is much in these papers of marked local importance.

C. L.

GIOSEFFI (M.). **La malaria nell'Istria media durante il 1920. Osservazioni sulla bonifica umana e sulla anofelologia regionale.**—*Policlinico.* Sez. Prat. 1922. Jan. 23. Vol. 29. No. 4. pp. 113-119.

In a year whose rainfall to November 22 reached 647 mm., as against a normal annual fall of 1,088 mm., and in which the precipitation from July 1 to November 22 was only 163 mm., so that in the autumn all anopheline breeding-places were completely desiccated, improved malarial returns are attributed to better feeding of the inhabitants, increase of domestic animals, the larvicidal campaign of the preceding year, and only lastly to the drought of that under review. An anti-malarial campaign must, it is emphasized, be based upon registration of every inhabitant, individual by individual, and the ascertainment of his malarial state—actual, not apparent—using as aids such activators as adrenalin and strychnine. Every schoolmaster must, taught by an intensive course of instruction, be in a position to enlighten his scholars in the subject. It is not clear how far the ideal and the practical have been combined in this particular instance.

C. L.

THE TRANSVAAL EDUCATION DEPARTMENT. **Report on the Medical Inspection of Schools for the Year ended 31st December, 1920.** [LEIPOLDT (C. Louis), CLEAVER (Anne F.) & ELIAS (P.), Medical Inspectors of Schools.]—60 pp. With 13 text figs., 1 plate and 1 folding map. 1921. Pretoria: The Government Printing and Stationery Office. [T.P. No. 4. '21. Price 1*s*.]

So important is malaria deemed to be in its adverse influence upon education in the Transvaal that half of this pamphlet is occupied by a special report on malarious schools. Appraisement of this report's value is not so easy as at first sight it appears to be. There is a clear and simple outline of the life-history of malarial parasites, although one must take exception to *Anopheles mauritianus* being designated as an "intermediate" host. Primary latency is described as common; 10 gr. of "quinine" weekly, in two 5-gr. doses, with an interval of two days between each dose, is advised as sufficient for a school-going child, but the treatment must be regular, prolonged and systematic. Wire gauze protection of hostels and teachers' houses is evidently found more reliable than are mosquito nets, and satisfactory general instructions for the destruction by teachers of mosquito larvae are issued. It is perhaps unreasonable to expect, in a report of this nature, any reference to the type of malaria prevailing, or to the grounds on which the diagnosis of malaria is based, but it would be amazing that the whole booklet contains no reference to ankylostome infection were it not that reports of this infestation from the Transvaal are seemingly as rare as, till recently, they were from the Bombay Presidency. The description of the "chronic malarial child," his general symptoms, apart from the enlarged spleen and possibly the icteroid conjunctiva, his stunted growth, his mental incapacity, suggest ankylostomiasis, so that without complete blood and stool examination, it is unsafe to attribute them wholly to either parasite in countries where both parasites exist. The Transvaal lies within the world's hookworm belt, bordered by countries in which its prevalence is recognized—Natal, further from the equator, has recognized it for 17 years ; free meals are provided at schools, so that there is clearly a poor-white problem as definite as exists in the United States ; several of the illustrations show boys running barefoot under conditions which suggest that this is habitual with them. Further investigation, therefore, may discover that a good deal of the misery here attributed entirely to malaria may be due to ankylostome infestation ; and irremediable until this is extirpated.

C. L.

STEPHENS (J. W. W.). **Malaria on a Venezuelan Oilfield.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 435–444. With 2 plates.

The proximity of European staff quarters to the dwellings of the native labourers, and of both to an anopheline swamp, violate first principles. An excellent site exists for the former on a ridge 300 feet high and a mile from human infection. In view of the expense of moving these quarters, it is recommended as a preliminary that one of the two native villages, one which is highly infected, should be eliminated, and the effect of partial drainage of the swamp, properly carried out under Professor Stephens' supervision, watched.

C. L.

NEDERGAARD (N.). **Malaria in Eastern Cuba.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 381–388. With 3 charts in text.

During 12 consecutive months there were admitted to the hospital of a large Cuban sugar estate 5,453 persons. In 5,161 of them the blood was examined by the writer, or the results of the examinations of others checked by him. Of these, 2,458 gave a positive diagnosis of malaria, 296 being tertian, 25 quartan, and 2,154 subtertian cases. These are stated to represent minimal numbers, since many persons had had quinine before admission to hospital and "showed no parasites in the blood, although they were suffering from the immediate consequences of malaria." This conclusion can be accepted, since, with this heavy local infection, amounting to 47·6 per cent., only 0·3 per cent. were noted as showing a double infection. An attempt is made to correlate the very different racial incidence, with corresponding variations in housing and occupation. It was further found that where a case did not clear up and enter upon the usual rapid convalescence, this frequently resulted from a concomitant hookworm infection. The economic importance of this heavy malarial morbidity is, the writer points out, imperfectly appreciated in Cuba.

C. L.

HANSON (Henry). **A Review of the Malaria Incidence on the Canal Zone. (Period of 1904 to 1918, inclusive.)**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1919. Jan.–Dec. Vol. 12. Pts. 1 & 2. pp. 27–29.

Malaria increased in the Panama Canal Zone during 1918. In the regular sanitated areas cases fell to 182, the lowest recorded; but 290 cases occurred among a number of jungle-clearers in unsanitated areas. The good results in protected areas are due to unremitting care. Were this relaxed, sickness and death-rates would undoubtedly fall back from the present rates of 1·7 and 0·09 respectively towards those of 1906, namely 85 and 7·45.

C. L.

WALCH (E.) & WALCH-SORGDRAGER (B.). [In Dutch and English.] **Een Malaria-Epidemie, veroorzaakt door** *M. sinensis.* **A Malarial Epidemic caused by** *M. sinensis.*—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 1. pp. 2–47. With 1 chart and 1 map.

This report concerns a malarial epidemic occurring among the contract coolies of a coconut plantation near the coast of Sumatra. Before treatment was instituted the proportion of benign to malignant tertian infestations was as 34 to 76, while crescent carriers amounted to 83 per cent. of all infected, and among women to 90 per cent. The percentages of enlarged spleens were practically the same. Examinations of mosquitoes elicited a very interesting condition, the results being as follows:—

	Number dissected.	Number infected.	Percentage infected.
A. ludlowi ..	58	10	17·5
A. sinensis ..	7,257	107	1·5
A. kochi ..	79	9	11·5
A. aconitus ..	43	1	2
A. punctulatus	1	1	—

That is to say, although both *A. ludlowi* and *A. kochi* were far more favourable hosts for benign or malignant tertian parasites than was *A. sinensis*, yet its enormous local numerical preponderance made the last mosquito the one mainly concerned in the propagation of this particular epidemic. While it is acknowledged that *A. sinensis* is experimentally capable of infection, this is believed to be the first instance in which it has been reasonably implicated as the cause of an epidemic.

The writers do not completely subscribe to the belief that coarse pigment in the oocyst denotes the subtertian, and fine oblong pigment the tertian, parasite, for they are confronted with the question as to what inference is to be drawn from those cases in which the pigment is fine and round, and from those large cysts which contain both coarse and fine oblong pigment. Since the writers see no prospect of settling the matter, except by direct inoculation experiments, it may perhaps be concluded that they do not necessarily attribute all the infections to human malaria.

As soon as there was started a course of bisulphate of quinine, in doses of 1·5 gm. [gr. xxii] daily for five days, and subsequently for some months on two consecutive days in each week, there was a diminution in sickness, in absenteeism, and in the more direct evidence of malaria afforded by blood and spleen. At the same time oocysts with fine oblong benign tertian pigment ceased to be found, and the proportion of benign to malignant tertian infections changed from that noted above, becoming as 47 to 53. The conjunction of these last conditions evidently puzzles the writers, but confirms the conclusions of MAYNE [this *Bulletin,* Vol. 16, p. 310] and WENYON [*vide supra*] that quinine is reasonably potent against the schizonts of subtertian and the gametocytes of tertian malaria, but not vice versa. The building of buffalo houses gave no satisfaction. The type used is not indicated.

C. L.

SCHÜFFNER (W.) & HYLKEMA (B.) [In Dutch and German.] **De Malaria-Epidemie te Naras (Priaman) in het Jaar 1918. Die Malaria-Epidemie in Naras im Jahre 1918.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 1. pp. 48–91. With 3 folding charts and 4 illustrations.

Naras is a large village of 3,600 inhabitants on the West Coast of Sumatra. A serious epidemic therein was carried, at least predominantly, by *A. ludlowi.* All three species of parasite were implicated, the subtertian predominantly and the quartan slightly. Quinine acted most satisfactorily. At the time of examination the number of infected mosquitoes was 6 per cent.

C. L.

BELAI (A.). **Beobachtungen bei einer Epidemie von Tertianafieber in russischer Kriegsgefangenschaft.** [Observations on an Epidemic of Tertian Fever among Prisoners of War in Russia.]—*Wien. Klin. Woch.* 1922. Jan. 19. Vol. 35. No. 3. pp. 57–58.

Of a party of 600 Austrian officers in a prisoners-of-war camp at Tozkoje, Samara, European Russia, half exhibited evidence of malarial infestation. As no Anopheles were found there after August, 1918, it is inferred that this is the last possible date of infection. Quinine was so scarce that it was reserved for special and complicated cases. At the end of September, 1918, all these officers were transferred 3,000 kilometres to an already established and occupied camp at Krassnojarsk, Jenisseisk, Siberia, a large proportion of those hitherto free from any evidence of infection going down with malaria during this nightmare journey of eleven days in cattle trucks. Arrived at Krassnojarsk, conditions were more normal. Food was abundant; quinine was sufficient; the interrelation between malaria and acute gonorrhoea was studied. While here almost all those transfers who had hitherto escaped malaria fell ill from it, the last case in August, 1919. It is accordingly concluded, the cases having evidently been without quinine, that the primary latency of this infection may reach one year. The writer is evidently convinced that Anopheles were absent from the second camp, for he is at a loss to explain the appearance of benign tertian malaria in five of the original members of the hitherto malaria-free camp. Since these men slept next to, or close to, infected newcomers, he suggests the bed-bug as intermediary, but does not point out that, whatever be thought of this suggestion, the appearance of malaria among original members of the Siberian camp must necessarily weaken the validity of his evidence as to the long primary latency of the cases from the European camp. The diagnosis appears to have necessarily been clinical.

C. L.

FAIRLEY (N. Hamilton) & DEW (H. R.). **The Clinical and Applied Pathology of Malarial Infections, with Observations on 1,135 Cases.** —*Australasian Med. Congress. Transactions of the Eleventh Session, held in Brisbane, Queensland, 21st–28th August, 1920.* pp. 637–646. (Discussion, pp. 645–646.)

Of 5,200 blood films examined during two years in the Near East, 1,077 were malarial, the parasite being malignant tertian in 389, benign tertian in 665, and quartan in 23. The pathological basis on which the severity of the first rests is believed to lie in its production of agglutination in infected erythrocytes. Out of 80 fatal cases death is considered as being uncomplicated in 13 only, the immediate cause being broncho-pneumonia in 47, bacillary dysentery in 15, and general sepsis in 5; but surely it might as fairly be stated that in a malarious country malaria may be a concomitant of every illness, while the tropical practitioner naturally allows for the possibility of at least two concurrent infestations. In cellular pathology, it not being stated whether the infection was or was not complicated by concomitant bacillary or helminthic infestations, there was found a remarkable erythroblastic response in the red marrow; myelocytes and myeloblasts were scanty; malarial parasites and pigment were usually undergoing phagocytosis. In cases complicated by broncho-pneumonia there was little leucocytosis, 12,000 being almost maximal; while in uncomplicated cases in Australians the average leucocytic percentage was: polymorphs 53, lymphocytes 25, large mononuclears and transitionals 21. Since 16 persons who had received three intramuscular injections of 12 gr. of quinine showed at autopsy no parasites anywhere, it is concluded that more than this dose is unnecessary, it being held that this quantity is "sufficient to temporarily cause a complete disappearance of the parasites." But, if complete, why temporary, provided there be no reinfection? The writers agree with those who hold that quinine is much more nearly specific for malignant than for benign tertian cases.

C. L.

DARLING (Samuel T.). **The Tertian Characters of Quotidian Aestivo-Autumnal Fever.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 397–408. With 1 chart.

After referring to two uncomplicated experimental infections with *Plasmodium falciparum* conveyed by mosquitoes reared from larvae, in which the initial paroxysms were tertian and the subsequent ones quotidian [see this *Bulletin*, Vol. 17, p. 144], and having emphasized the importance of noting in detail the form and timing of the different portions of the temperature chart, Darling proceeds to a critical examination of those with which CRAIG illustrated the paper in which he upholds his division of "aestivo-autumnal" fever into two entities, a quotidian and a tertian, with corresponding parasites [*loc. cit.*, Vol. 18, p. 93]. On this analysis Darling maintains that all CRAIG's charts show a definite tertian periodicity, obscure in some, definite in others, and quotes his own original conclusion that "The creation of a specific plasmodium to account for clinical forms of aestivo-autumnal fever having a quotidian periodicity is probably unwarranted."

C. L.

LOEWY (Julius). **Ueber die Möglichkeit der Ueberwinterung infizierter Malariamücken.** [The Possibility of Malaria-infected Mosquitoes surviving the Winter.]—*Mediz. Klinik.* 1921. Apr. 17. Vol. 17. No. 16. p. 471.

Malarial morbidity in Belgrade reaches its maximum in September and disappears entirely in February. In this latter month two infants, lodged in a children's asylum there, situated close to swamps, developed benign tertian malaria. Relapse, the writer continues, can be absolutely excluded; no one in the asylum was ill of malaria; therefore the infection must have been conveyed by mosquitoes wintering in its warm rooms and infected the previous autumn; which reasoning and conclusion clearly imply the belief that latency, primary or secondary, is no feature of malaria; and many have rather emphatic convictions of an opposite kind.

C. L.

CREMONESE (Guido). **Der Mechanismus des Malariafiebers.**—Reprinted from *Ztschr. f. Hyg. u. Infektionskr.* 1921. Vol. 92. No. 3. pp. 475–484.

There are, it is stated, certain persons absolutely immune to malaria: there are others who are relatively immune; become infected, that is, but show no ill effects. These two phenomena are considered as analogous. In other words, the writer draws no distinction between the power to prevent entrance and survival of the parasite, and the adequate compensation of the ill-effects which it produces [ROSS, this *Bulletin*, Vol. 18, p. 338]. There follows the statement that mosquito infection is greatest in the autumn, and that consequently human infection must in the main be then acquired, a conclusion which carries the corollary, the unity of species being postulated, that the spring outbreak is the first evidence (induced by climate on humoral antibodies) of a long-latent autumnal infection. In other words, primary latency is held to be the rule in malaria; and yet it will be recollected that it was apparently his disbelief in primary latency which actually converted GRASSI to the unity theory [this *Bulletin*, Vol. 17, p. 293]. Natural immunity is held to depend upon the parasite acting as antigen, but only thus acting so long as it is extracorpuscular. Once intracorpuscular, complement is held to be powerless to pair it off with antibody. The function of quinine is, Cremonese believes, quite clear; since it is, he says, well established that quinine enters the red blood corpuscles and there remains for 24 to 48 hours; and since by running quinine solution under a coverglass malarial parasites have been seen breaking out of the erythrocytes, it follows that they have been driven out by the quinine, only to fall victims to the antibodies lurking in the plasma.

Although Cremonese is such a strong advocate of the long latency of malaria, he cites as quite definite proof of the mutability of the two forms SHOO's observation that 80 per cent. of the persons who in Java had subtertian fever, suffered in Holland from the benign tertian form. A double infection with latency of the benign tertian and cure of the malignant tertian species, ought in fairness to have at least been mentioned as a possibility. This double infection seems to be overlooked by Italian observers, but that it is common in Italy itself can hardly be doubted, seeing that RUSS (*vide supra*) reports it in one-third of his predominantly Italian and Sardinian infections.

C. L.

i. LUCEY (H. C.). **Observations bearing on the Reliability of the Large Mononuclear Count as an Aid to the Diagnosis of Malaria.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1921. Oct. Vol. 14. No. 12. pp. 53–64. (Discussion pp. 64–70.)

ii. BROUGHTON-ALCOCK (W.). **Laboratory Observations on Pensioners who contracted Malaria in the Late War.**—*Ibid.* pp. 45–53.

iii. KOP (W. A.). **The Change in the Leucocytic Blood-Picture as a Symptom of Malaria.**—*Jl. Trop. Med. & Hyg.* 1921. Nov. 1. Vol. 24. No. 21. pp. 278–283. With 15 charts in text.

i. The most interesting fact emerging from Lucey's paper is that in a perfectly normal person who had never had malaria, and whose venous blood showed a normal percentage of large mononuclear leucocytes, namely 7, the first drop of blood from the lobe, or border, of the ear gave a percentage of these leucocytes varying from 35 to 41. No percentage differing appreciably from the normal was ever obtained from finger blood; from the third drop of blood from the ear; from the blood of the lobe of the ear after this had been massaged or flicked, heated or cooled, or after exercise had been taken. It is concluded that in the ear, owing to its inactive circulation, the large mononuclear leucocytes tend to stagnate and cling to the capillary walls; but that when the circulation is rendered brisk they are swept off, the blood obtained from this part then forming a fair sample of that circulating generally. The kind of needle used for the puncture, the kind of prick employed, the technique of spreading, whether by pull or push, influenced the count not at all. It is clear that if the ear must be used as the source of blood for a film two drops must be wasted before the film is made.

ii. Broughton-Alcock finds that latent malarial cases invalided to this country cannot be expected to show an increase of large mononuclear leucocytes, large lymphocytes being excluded from this category. Significant of the parasitic tendencies of the pensioned old soldier is the fact that in one-third of the cases in which quinine was ordered the invalid had refrained from throwing on his system the strain of dealing with it, his urine betraying him.

iii. Kop, writing from the Central Military Laboratory, Weltevreden, Java, and dealing with more active malarias than did LUCEY and BROUGHTON-ALCOCK, concludes that, taking into consideration only the large mononuclear and transitional leucocytes, there is not often in malaria a mononucleosis of over 15 per cent., and that the high counts reported are due to inclusion of large lymphocytes. He finds, however, that a shift to the left of the Arneth count, a diminution, that is, in the number of nuclear lobes possessed by the polymorphs, is a constant and persistent symptom of malaria and indicates that there is likelihood of a relapse.

C. L.

MARCHOUX (E.). **Influence du bien-être sur la régression du paludisme.** [With Discussion.]—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 455–459.

In 1821 a stringent law enforced the reclamation of the marshes about Charente and Vendée, and as a result the population lost the anaemia and fever from which they had been so generally suffering. The law gradually fell into desuetude, since fishing in the marshes brought in a living as profitable as and far less laborious than did agriculture in the reclaimed land; and the marshes are now as extensive as they were in 1821. Nor is there poetic justice in the matter, for though mosquitoes swarm and the influx of carriers has been great the people are not fever-stricken. This escape from the effects of sanitary iniquity is attributed partly to the multiplication of animal houses, which, as ROUBAUD has shown, shield [under certain definite conditions] human beings from anopheline attack; but in the main to increased well-being in the population, since no one would dream of attributing the spontaneous disappearance of malaria which has occurred to the treatment which has been given. BRUMPT challenges this conclusion, local inquiries having convinced him that the disappearance of the endemic foci of malaria in France is due to the use of that beneficent drug quinine.

C. L.

BENHAMOU, JAHIER & BERTHELEMY. **Azotémie et paludisme; pathogénie de certains accès pernicieux.**—*Presse Méd.* 1921. Nov. 16. Vol. 29. No. 92. p. 912.

Cases are cited suggesting strongly the importance of estimating the quantity of urea in the blood of those suffering from pernicious attacks of malaria. In favourable malarial cases this is present to a percentage of between 0·27 and 0·52, this amount being slightly increased during the febrile attack. If the quantity exceed these limits prognosis becomes grave, and if it rise rapidly, or reach 2 per cent., death is probable, and energetic quininization and serum with glucose are indicated. On the other hand, coma with many parasites and a low urea content is, in the writers' experience, followed by cure, if quininization be sufficient.

C. L.

BONAIN (C.). **Note au sujet de l'expression "paludisme de première invasion."**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 636–637.

Objection is taken to the looseness of the phrase occurring in the title and sanctioned by the International Commission of Hygiene. The writer recommends that terms used should specify—from the point of view of infection, whether the attack is the first or second; from the point of view of the attack, whether its phase is primary or secondary; from the point of view of microbiology, whether the evolution of the parasite corresponds to primary or secondary malaria; and from the point of view of organic lesions, whether these are secondary or tertiary. One can, however, scarcely expect that there will come into general use terms indicating conditions which so many consider either impossible of determination or definitely incorrect, and no one has pointed this out so emphatically as Bonain's own countrymen.

C. L.

NEUKIRCH (P.). **Zur Kenntnis der Malaria der Kriegsteilnehmer.** [Malaria among Troops.]—*Med. Klin.* Berlin. 1921. Aug. 28. Vol. 17. No. 35. p. 1060.

Being attacked on the ground that his opinion, based on the experience of 399 malarial cases in Turkey, that quinine does not sterilize malarial patients is incompatible with his belief that there would be no widespread malarial epidemic in Germany induced by the return of men infected on service, the author maintains that quinine does not cure but only suppresses malaria; time, climate, good-living and absence of reinfection being the real curative agents. C. L.

SCHIASSI (Francesco). **Sull'organizzazione del servizio di profilassi contro la malaria nell'esercito mobilitato durante la campagna di guerra 1915–1918.**—*Giorn. di Med. Milit.* 1922. Jan. 1. Vol. 70. No. 1. pp. 13–35.

This report indicates the large amount of antimalarial work, following the usual lines, undertaken for the 3rd Italian Army. Microscopic examination was undertaken in the pre-epidemic period with a view to detecting gametocyte carriers. They were paraded and treated with 3-gr. quinine tablets, eight being given daily for a week, four for the next fortnight, and two for the following two months. Malaria occurred in 19 per cent. of 9,000 men so treated. During the endemic period special hospitals and convalescent camps were instituted for malarial cases. Antilarval measures were adopted as far as possible, but metallic screening and petrolization were difficult on account of scarcity of material. Out of 2,497 positive blood examinations in which the species of parasite was noted, 1,201 were infestations with benign tertian, 15 with quartan, and 1,281 with malignant tertian malaria. In other words, no single case of double infection was noted. C. L.

DIONISI (Antonio). **La malaria delle terre redente.** [Malaria in the Territory regained by Italy.]—*Giorn. di Med. Milit.* 1921. June 1. Vol. 69. No. 6. pp. 221–236.

The condition of the malarious districts lying between the Julian Alps and the Adriatic has been worsened by the abandonment of agriculture and the flooded shell-holes consequent on fighting over this area. The same conditions have handicapped prophylaxis. The controlled ingestion of quinine was found very efficacious. Special treatment centres established close to the main body of troops, although their mechanical protection from mosquitoes was inadequate, did not seriously affect the diffusion of malaria in the district; at the same time their position facilitated speedy diagnosis and early treatment, and so must have saved many soldiers' lives. For the civil population a serious problem remains. The writer urges the establishment of a provincial bureau administered by a physician, a sanitary engineer, a zoologist, and an agricultural expert, to correlate the fight against malaria with agricultural reconstruction. J. Rosslyn Earp.

JONA (Giuseppe). **La tinta dei malarici.** [The Colour (of the Skin) in Malaria.]—*Policlinico.* Sez. Prat. 1921. July 18. Vol. 28. No. 29. pp. 971–976.

There is nothing specific about the colour of the skin in malaria; in the majority of cases it is due simply to a profound secondary anaemia. In order of frequency it is found to be earthy-yellow, earthy-grey, waxy-white, according as yellow, brown or white is the fundamental colour of the individual's skin. Sometimes it is subicteric, the jaundice being most often of a form intermediate between haemolytic and retention. The malarial pigment is not fixed in the skin. While malarial melanoderma may be admitted as a possibility, it is certainly a very rare and exceptional condition.

J. Rosslyn Earp.

i. SUTHERLAND (Halliday). **Glycosuria of Malarial Origin.**—*Brit. Med. Jl.* 1921. Nov. 5. pp. 746–747.
ii. ORLEBAR (Alexander). **Malarial Glycosuria.** [Correspondence.] —*Ibid.* 1922. Feb. 4. p. 209.
iii. SEIDELIN (Harald). **Glycosuria of Malarial Origin.** [Correspondence.]—*Ibid.* Feb. 18. p. 290.
iv. CASTELLANI (Aldo) & WILLMORE (J. Graham). **Malarial Glycosuria.** [Correspondence.]—*Ibid.* Feb. 25. p. 330.

i. A man of 30, suffering from tuberculosis microscopically established, developed a temperature of 104·2°; and the onset of tubercular meningitis being accordingly suspected, the urine was examined and the suspicion strengthened by the finding of glycosuria. The temperature however fell, to rise again on the third day, this time without glycosuria, but, as blood examination now undertaken showed, with malarial parasites present.

ii. It is pointed out that the description of CASTELLANI & WILLMORE'S first case of malarial glycosuria [this *Bulletin*, Vol. 18, p. 333] is incomplete. While under Dr. Orlebar's care he had evidence of mild Graves' disease, namely tachicardia, slight exophthalmos, some thyroid enlargement, and tremors; and *temporary* glycosuria is fairly common in Graves' disease. He had plenty of quinine before passing under Dr. CASTELLANI's care, and has had it since, but continues to have malarial attacks, without glycosuria. "It would appear possible that rest, quiet, and freedom from worry whilst in hospital improved his hyperthyroidic condition, and so caused a disappearance of the glycosuria. . . . The condition is so rare that it appears desirable to exclude all other possible diagnoses before making this one."

iii. Writing from the Belgian Congo, Seidelin suggests that "Glycosuria in a malarial subject" constitutes the best description for these cases. He points out how widely opinion has varied on this subject, and adds, "During a fairly long tropical experience in various parts of the world I remember no cases of glycosuria in which I had reason to suspect malaria as the cause."

iv. Castellani and Willmore adhere to their original diagnosis on the grounds that there was evidence from the Brighton clinic that quinine was not being excreted, and so not taken; that glycosuria persisted until he had received quinine intensively and under supervision; that malaria also disappeared according to report from Endsleigh Gardens and Brighton, and that glycosuria did not reappear after he left their care, although hyperthyroidism increased. C. L.

BRAUER (L.) & FRAENKEL (E.). **Das Malariaexanthem im klinischen und pathologisch-anatomischen Bilde.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 355–363. With 1 coloured plate and 7 figs.

A worker in a Warsaw village reached Hamburg via Danzig, and was admitted to hospital with fever and a petechial rash symmetrically arranged on the outer side of the arms, on the gluteal region, and to a less extent on the forearms. He had rigors, and a blood examination disclosed benign tertian parasites. Two of the petechiae were excised, and displayed extravasation of blood with a cellular exudate, and thrombi becoming organized within the vessels. Naturally enough, the thrombi exhibited plasmodia. The condition was not due to quinine, since none had been taken; indeed, there was no history of previous malaria. The coagulability of the blood is not noted. The condition is attributed to the malarial virus, in opposition to MÜHLENS' quoted belief that it has never been shown that the "malarial exanthem" is really the result of malaria.

C. L.

PAISSEAU (G.), SCHAEFFER (H.) & ALCHECK (E.). **Névrite paludéenne du nerf circonflexe.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Nov. 24. Vol. 45. No. 33. pp. 1498-1504.

A Roumanian of 22 had an attack of benign tertian malaria, and complained of a persistent pain in the left shoulder, with awkwardness in movement. On awaking in the morning, thirteen days later, he found himself unable to raise his left arm, and wasting of the deltoid was apparent. After another febrile attack, three months later, there was slight implication of the supraspinatus and infraspinatus muscles, with slight diminution and retardation of sensibility in the posterior and outer aspects of the upper arm. The electrical reactions were as in neuritis. The Wassermann reaction being negative, and no other causation clear, it is concluded that this constitutes the thirty-seventh recorded case of peripheral neuritis from malaria. It is suggested that the lesion is essentially vascular.

C. L.

HOME (W. E.). **Malaria and Urobilinuria.**—*Jl. Roy. Army Med. Corps.* 1921. Dec. Vol. 37. No. 6. pp. 463–464.

A trumpeter of 17, after seven years in India and a subsequent year at home with no history of malaria, developed fever with urobilinuria. A blood film showed a very sparse infection with *Plasmodium vivax* and quinine cured the condition. Rolland's test for bile pigment in the urine is recommended. It consists of iodine 1, potassium iodide 1, water 50, rectified spirit 150. This solution floats above the urine; it gives a sharp interface and a green line between, if bile pigment be present.

C. L.

BERSANI (Iginio). **Crisi leucemoide in malarico.**—*Policlinico.* Sez. Prat. 1921. Aug. 8. Vol. 28. No. 32. pp. 1069–1071.

A patient with chronic malaria suffered from typical attacks, one of which eventually proved fatal. Blood examination showed the presence of the plasmodium and resultant changes in the red cells. The attention of the writer was attracted by the white cell count, which was as follows :—Haemocytoblasts, 16 per cent.; Rieder's cells 5 per cent.; myeloblasts, 12 per cent.; lymphoblasts, 11 per cent. neutrophil myelocytes, 5 per cent.; prolymphocytes, 1 per cent. metamyelocytes, 11 per cent.; lymphocytes, 23 per cent.; polynuclear leucocytes, 16 per cent. The writer suggests that to account for this blood picture there must have been some secondary infection.

J. Rosslyn Earp.

Anderson (A. Greig). **Malaria in Macedonia, 1915-1919. Part II. Clinical Observations on the Treatment of Malaria in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1922. Jan. Vol. 38. No. 1. pp. 25–40. With 2 charts in text.

The hospital at which the work here described was carried out was situated in an almost mosquito-free spot, the men being, in addition, protected by nets. Reinfection during treatment and observation, the latter generally covering 100 days, can accordingly be practically excluded. A case is classed as non-relapsing, provided it did not relapse during observation. For the purpose of the investigation a relapse is defined as a recurrence of fever accompanied by parasites in the blood. This limitation had to be made because the cases were so numerous that routine examination of all was impossible. The main essentials of the investigation are summarized in the accompanying condensation of the tables. All the cases were of benign tertian infection, except three of (7) and two of (8).

Treatment.	Admitted before July 1.		Admitted after July 1.		Total.	
	Number treated.	Percentage of non-relapses.	Number treated.	Percentage of non-relapses.	Number treated.	Percentage of non-relapses.
(1) Ross C. 17 ..	44	41	—	—	44	41
(2) Oral quinine and galyl ..	25	28	14	71·5	39	43·6
(3) Intramuscular quinine and galyl ..	21	28·6	37	64·9	58	51·8
(4) Ravaut's treatment ..	22	31·9	22	63·7	44	45·5
5) Oral quinine, 45 grs. daily	—	—	—	—	18	55·5*
(6) Oral quinine, 20 grs. daily	—	—	—	—	16	37·5*
(7) Double intensive intramuscular quinine ..	24	29·2	34	82·4	58	60·4
(8) Double intensive oral quinine ..	—	—	49	69·4	—	—
(9) Cacodylate of soda with (8)	—	—	25	68·0	—	—
(10) Week-end course of 60 grs. quinine	—	—	58	77·6	—	—
(11) Week - end course of 90 grs. quinine	—	—	21	61·9	—	—
(12) Controls ..	17	23·6	27	37·1	44	31·8

* Numbers too small to analyse in two series. Of total: 16 admitted previous to July 1, 18 after.

(1) For 12 days, bed and 60 grains of quinine daily, divided between 2 intramuscular injections of grains XV each and the rest by mouth. For 3 more days, 60 grains of quinine by mouth; confinement to bed and injections ceasing. For 14 more days, 20 grains of quinine daily, divided into 4 doses.

(2) As in (8), but with 6 weekly intravenous injections of galyl, the first of 20 cgms., the others of 40.

(3) As in (2), except that 2 of the 20-grain daily doses of quinine were given intramuscularly.

(4) Sodium cacodylate 0·2 gm. daily hypodermically for 4 days; 30 grains of quinine hydrochloride in 2 15-grain doses by mouth for the next 4 days; and so on alternately for 32 days.

(5) In 15-grain doses and given over 1 month.

(6) In 10-grain doses and given over 1 month.

(7) This apparently consisted of bed for 4 days, with 2 daily intramuscular injections, the quantity being unstated, of quinine bihydrochloride and of 20 grains of quinine hydrochloride by mouth daily. There was then seemingly an entire omission of treatment, the man being up for 10 days, after which the course was repeated.

(8) For 4 days bed with 60 grains of quinine hydrochloride daily in 3 equal doses. The course was repeated after an interval of 10 days.

(9) As in (8), with, in addition, 3 times a week for 5 weeks 3 grains of sodium cacodylate hypodermically.

(10) 10 grains 3 times daily on 2 consecutive days a week for 8 weeks.

(11) As in (10), but with 15-grain doses.

(12) Quinine given only during an acute attack.

Ross's treatment was poorly borne, and accompanied nearly always by nausea, vomiting, tinnitus, deafness; always by indurated buttocks. In all intramuscular treatments there occurred in a number of cases a rise of temperature to 100°, with a leucocytosis up to 27,000. Although all intramuscular injections are accepted as producing necrosis, in only one case in 960 did an abscess occur. Interrupted administration was much better tolerated than was continuous quinine administration. The influence of the period of the year on benign tertian relapse, so strikingly brought out in the Table, is a factor largely or wholly neglected in estimating the value of various kinds of treatment [see this *Bulletin*, Vol. 13, p. 85]. It is also emphasized that the results of treatment after July 1, as between the different methods, do not vary much. It seems indeed questionable whether, on the numbers here made available, reliable evaluation is possible, but clearly it can only be by the aggregation of such careful compilations, prepared under comparable conditions, that the matter can be finally settled.

C. L.

NORMET. **Le traitement du paludisme.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 202–207.

This paper takes a deliberate ex-cathedrâ character, being intended as a guide to young colonial officers. The methods advised are clearly unsuited for mass treatment, and the experience described does not in all respects—as in the value of quinine in malignant tertian malaria—tally with that of others in other parts of the world. In a suspected malarial infection thick and thin smears are taken and sent to a laboratory. Quinine is then at once begun in injections, presumably intramuscular, and in doses of 1·5 gm. daily for three days in a man weighing 70 kilos. This route is preferred to the oral, because the drug cannot be rejected, and being absorbed more slowly is excreted more slowly. If the laboratory report benign tertian malaria, quinine is administered over 18 days in diminishing doses of 1, 0·7 and 0·5 gm. Then follow five injections, each of 10 cgm. of hectine, on alternate days; next a week of powdered cinchona, or, still better, quinine. Another course of hectine, similar to the first, is next required, and thenceforward a preventive nightly dose of 0·25 gm. quinine so long as the individual remains within range of infection. If the laboratory report malignant tertian infection, quinine is looked upon as, by itself, incapable of effecting a cure. The dose of hectine must be doubled. If coma supervene, venesection to half a litre, with intravenous injection of quinine and novarsenobenzol, are reasonable procedures, but, in the writer's experience, useless. The two other complications noted are haemoglobinuria and neuritis.

C. L.

HODSON (V. S.). **The Cure of Malaria.**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 16. Vol. 25. No. 2. pp. 18–20.

The writer believes it to be unwise to rely solely upon quinine and to disregard, as he puts it, "the very valuable help to hand in the *vis medicatrix naturae* element." He gives cogent instances in which malnutrition and fatigue have induced malarial manifestations. He claims to effect his purpose by giving quinine for three or four days each week, three days if 15 gr. daily be given intramuscularly, four days if 20 gr. daily be given orally. His idea is that as parasites develop in the quinine-free period, immune bodies are formed and tolerance to the drug is not induced. Concomitant helminthiasis is considered to be a considerable handicap to successful treatment. No controls were apparently used. Benign is held to be more resistant to quinine than is malignant tertian malaria.

C. L.

RIGOLLET. **Menace d'avortement dans le cours d'un accès pernicieux. Guérison par le traitement quinique.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 535–537. With 1 chart in text.

To give quinine during pregnancy is commonly held to be almost scandalously hazardous. ACTON has urged, on experimental grounds [this *Bulletin*, Vol. 17, p. 306], that the risk of abortion from the effect of maternal high temperature on the foetus in malaria is greater, provided the os has not dilated, than is the risk from quinine. Moreover, this *Bulletin* has recently contained evidence that foetal malaria may occur; and, presumably, foetal death and maternal abortion may follow foetal malaria. It is, at all events, clear from the following report that M. Rigollet has strong grounds for urging that energetic quininization during threatening abortion may be not merely salutary but actually essential. A woman of 19, in the third month of pregnancy, had benign tertian malaria, with vomiting, diarrhoea, strong uterine contractions [evidently without discharge], coma, and a temperature which reached as high as 40·8° C. [105·4° F.]. Oral quinine being in the main rejected, the drug was administered intravenously and intramuscularly to the extent of 1·2 gm. on one day and 1·8 gm. on the next. The uterine contractions became very painful. An intravenous injection of 0·3 gm. on the third day was followed by crisis, with general amelioration and disappearance of the pains. Cure under oral quinine then progressed uneventfully, pregnancy being uninterrupted.

C. L.

WOOD (E. Lomax). **A Note on the Treatment of Vomiting in Malaria.** —*Practitioner.* 1921. Dec. Vol. 107. No. 6. pp. 443–444.

Of eight cases of vomiting in acute malarial fever, six were treated with 7–8 minims of Liq. adrenalin hydrochlor. in water. In all of them a single dose stopped the vomiting. In two controls, in which this drug was withheld, vomiting continued for twenty-four hours.

C. L.

BINI (Guido). **La cinconina può sostituire la chinina.** [Cinchonine as a Substitute for Quinine.]—*Policlinico.* Sez. Prat. 1921. July 4. Vol. 28. No. 27. p. 919.

During the antimalaria campaign in the province of Udine, in the year 1919, the writer was compelled by the shortage of quinine salts to make use of some 50 lb. of cinchonine sulphate. A comparison of those districts in which cinchonine was used prophylactically with those in which quinine was similarly used convinces the writer that from this point of view the two alkaloids are of equal value. No harmful effects were found to result from the administration of cinchonine, not a single case of haemoglobinuria being referable to its use during the whole campaign. [ACTON found cinchonine twice as effective as quinine in benign tertian malaria (this *Bulletin*, Vol. 16, p. 330). No harm seems ever to have followed its ingestion, although large quantities of it have been sold for years in India, it constituting 18 per cent. of cinchona febrifuge.—C.L.]

J. Rosslyn Earp.

DOERR (R.) & KIRSCHNER (L.). **Zur Malariabehandlung der progressiven Paralyse.** [Malarial Treatment of General Paralysis.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. May 7. Vol. 92. No. 2. pp. 279–290.

This is not to be classed with those papers on malaria printed recently with undue frequency in this language, which leave the unfortunate impression that they have been written, not because the writer has something to write, but because he has to write something. The investigation here detailed is prompted by the observation that febrile attacks induce improvement in general paralysis of the insane, whether such attacks be due to infectious or contagious diseases, or to injections of such material as dead bacteria, their toxins, or egg albumin. It was determined to try the effect upon such cases of infection by benign tertian malaria. The procedure was as follows:—From a man, 18 years of age, with benign tertian malaria contracted in Lower Austria, venous blood was aspirated, and after defibrination 1 cc. was injected into a paralytic case. This man subsequently developed benign tertian malaria, and when he was deemed to have suffered from the infection sufficiently long for the purposes of the clinical investigation a sample of his blood was removed, defibrinated and injected into a second paralytic. This process was continued, the infection being handed on from man to man, and each case being treated so soon as it was clear that the next in the series had been infected. The effect on the original trouble appears undetermined, but as a study in malaria the work is of considerable interest. The infection was passed through 23 different persons for 240 parasitic generations, covering a period of sixteen months. During this period its morphological characters [those of *Plasmodium vivax*] never varied. This morphological stability will surely constitute a teasing difficulty for consistent unity theorists. The infection was sometimes single, sometimes double. The period of incubation varied from 6–31 days. The infection was treated by 1 gm. of "quinine" daily for three days, and subsequently by 0·5 gm. daily for a fortnight. Weekly injections of salvarsan (0·3 gm.) or neosalvarsan (0·6 gm.) were also administered. During the period of observation, extending over 14–16 months, no relapse occurred, but in it three men died of intercurrent disease, and an autopsy on one of them, the twelfth passage, revealed no evidence of persisting malaria.

C. L.

VIALATTE (Ch.). **Sur des formes atypiques de** *Plasmodium praecox (falciparum)*.—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 236–239. With 1 plate.

The writer draws attention to forms of unusual shape:—Accoulée, pyriform, and even dendritic [see the coloured plates in ACTON's paper, mentioned in this *Bulletin*, Vol. 18, p. 335].

C. L.

HEINEMANN (H.). **Untersuchungen ueber den diagnostischen Wert der Methoden von Wassermann, Sachs-Georgi und Meinicke (D.M.) in Malarialändern. (Das Verhalten des Blutserums bei Malaria.)** [Investigation of the Diagnostic Value of the Wassermann, Sachs-Georgi and Meinicke Tests in Malarious Countries. (The Behaviour of the Blood Serum in Malaria.)]—*Muench. Med. Woch.* 1921. Dec. 2. Vol. 68. No. 48. pp. 1551–1553.

On comparing complement fixation reactions for syphilis, such as the Wassermann, with precipitin reactions, it is concluded that unspecific reactions are common in malaria but occur less frequently in the latter. The precipitin reactions are considered to be a valuable addition to complement fixation reactions, and to be permissible as a substitute for these, provided the local malarial error has been worked out. It is, however, best to use the two together.

C. L.

i. SOUTH AFRICAN MEDICAL RECORD. 1921. Nov. 26. Vol. 19. No. 22. pp. 441–442.—**Collective Investigation with Regard to Malaria.**
ii. LEONE (Raffaele). **Sul meccanismo patogenetico della perniciosa malarica.**—*Riforma Med.* 1921. Apr. 23. Vol. 37. No. 17. pp. 391–392. With 2 figs.
iii. GLASER (F.). **Malariatod durch Salvarsanschädigung.**—*Med. Klin.* Berlin. 1921. July 17. Vol. 17. No. 29. pp. 867–868.

i. With a view to focussing the experiences of those who have had an opportunity of studying malaria in South Africa and the adjoining regions, an exhaustive questionnaire, drawn up by Dr. Arthur PEARSON, has been addressed to the medical men concerned.

ii. Multiple infection of erythrocytes is described as conjugation.

iii. A man of 28 with syphilis, clinically and microscopically established, was treated with three mercurial injections, two of salvarsan and seven of sodium salvarsanate, the last of these on March 19. On March 21, fever with rigors, sweatings, and later, yellow discoloration of the skin set in. On March 31 malaria was recognized and two injections of quinine hydrochloride of rather less than 0·5 gm. each were given. He died on April 3. No parasites, but much pigment, were found after death, with universal icterus and much nephritis. Death is attributed to salvarsan lighting up old malaria.

C. L.

BARRETO MENDEZ (Guillermo). **Tercer Congreso Venezolano de Medicina, Valencia, 28 a 29 de Junio de 1921. El impaludismo en el Estado Cojedes.**—*Gac. Méd. de Caracas.* 1921. Aug. 31 & Sept. 15. Vol. 28. Nos. 16 & 17. pp. 245–253; 259–267.

BASS (C. C.). **Specific Treatment of Malaria.**—*New Orleans Med. & Surg. Jl.* 1922. Jan. Vol. 74. No. 7. pp. 521–528.

FLAMERICH (C.). **Breves anotaciones sobre el paludismo en la ciudad de Valencia.** —*Gac. Méd. de Caracas.* 1921. Nov. 30. Vol. 28. No. 22. pp. 339–340.

GIANFRANCO (Capuani). **A proposito della tinta dei malarici.**—*Policlinico.* Sez. Prat. 1921. Sept. 5. Vol. 28. No. 36. pp. 1205–1206.

MARINESCO (M. G.). **Report on a Case of Myoclonic Encephalomyelitis of Malarial Origin.**—*Proc. Roy. Soc. Med.* (Sect. of Neurology). 1921. Oct. Vol. 14. No. 12. pp. 51–55.

MUJICA (J. C. Alonso). **El paludismo en los territorios nacionales del Norte y provincia de Corrientes (Comisión profiláctica).**—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. July & Aug. Vol. 27. No. 4. pp. 199–207.

NEVEUX. **Projet d'organisation en Serbie d'un service de prophylaxie de la malaria.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 72–78.

ORTEGA (Diego B.). **Paludismo.**—*Gac. Méd. de Caracas.* 1921. Nov. 30. Vol. 28. No. 22. pp. 345–349.

SANGUINETTI (A.). **Cinconina e malaria.**—*Policlinico.* Sez. Prat. 1921. Dec. 5. Vol. 28. No. 49. pp. 1652–1653.

WILSON (S. A. Kinnier). **Case of Paralysis Agitans following Malaria.**—*Proc. Roy. Soc. Med.* (Sect. of Neurology). 1921. Oct. Vol. 14. No. 12. p. 48.

ERRATUM.

In Col. Clayton LANE's "Malaria: a Critical Review," Vol. 19, p. 96, latter part of the second paragraph, it is stated: "MESNIL and ROUBAUD have succeeded in infecting chimpanzees both with benign and with malignant tertian malaria." This should read: "in infecting a chimpanzee with benign tertian malaria." The page 32 in the same sentence should be 33. For "both infections," read "the infection."

KALA AZAR.

ADIE (Helen A.). **Preliminary Note on the Development of the Leishman Donovan Parasite in Spleen Juice and in the Alimentary Tract of** *Cimex lectularius* **(Lin.)**.—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 255–260. With 4 coloured plates.

This paper describes the conclusions at which Mrs. Adie has arrived as a result of her observations on the behaviour of *L. donovani* in the spleen of man and in the bed bug. It is illustrated by four coloured plates, containing numerous figures which depict the various forms of the parasite which have been encountered.

It is claimed that in the spleen of man there are large intracellular parasites which divide by multiple fission to produce torpedo-shaped merozoites, and that these can be seen leaving heavily-infected broken-down cells in large numbers. These merozoites enter other cells, where they can be seen developing and dividing and setting free still smaller merozoites. It is assumed that it is these small merozoites which develop in the bug. Here they multiply by binary fission and later flagellate, after which they visit the wall of the intestine and eventually bore their way into the cells. They become encapsuled in the cytoplasm and grow in size, finally producing bodies which are compared to the intracellular spheres which occur in the cycle of development of *Trypanosoma lewisi* in the flea. From these numerous flagellates are produced which escape into the lumen of the gut. They may enter other cells or undergo syngamy.

After describing the development in the bug in detail, the author informs us, towards the end of the paper, that the figures are mostly taken from a striking success obtained in a bug that had died six days after feeding on heavily-infected spleen juice. The bug was found dead on the sixth day. It was placed in saline and kept at a temperature of 27° C. for 24 hours. It had probably been dead 36 hours (presumably before being placed in saline).

The paper is of a highly speculative nature and contains many assertions which are not borne out by the figures. There is no indication that the multiple fission referred to as taking place in the spleen occurs at all. The figures do not show this process. The description of the development in the bug is most unconvincing, and the statements that flagellates are seen boring their way into the cells by their posterior ends requires far more evidence to support it than the paper contains. In order to make such observations on living specimens one must suppose that the gut was previously broken up and its cells completely dislodged, in which case many of them would have been damaged and all normal relations lost. The process of syngamy, again, requires more evidence to support it than is given by the illustrations referred to. The figures illustrating the process are evidently from smears, and they may equally well represent dividing forms or merely forms in accidental contact. From the figures it is impossible to tell whether all the types depicted are leishmania or not. Many of them possess only a single nucleus and have the appearance of organisms of another nature. They may be developmental forms of some sporozoon or even yeasts, and that the bugs are liable to infection with other parasites is proved by the presence of nematode larvae, which the author notes. Quite apart from the involved description of the developmental process described in this paper, it must be evident that very little value can be attached to the behaviour of leishmania in dead bugs in making deductions as to what will occur in the living insects. The intracellular stages of development may be merely a culture of leishmania in dead or dying cells. On the other hand, it is quite possible that many of the apparently intracellular forms seen in the smears are merely the result of overlying. It seems that the numerous fallacies connected with the smear method of examination of tissues have not been fully recognized.

C. M. Wenyon.

PATTON (W. S.). **Some Reflections on the Kala-Azar and Oriental Sore Problems.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 496–532. With 6 plates.

In this long and interesting paper the author gives verbal expression to certain thoughts and reflections which have been uppermost in his mind during the last few years. He has done this because he is unlikely to have any further opportunities of investigating the problems of the etiology of oriental sore and kala azar in India, subjects which have occupied his attention for the past 15 years.

As long ago as 1906 he came to the conclusion that the parasites of kala azar and oriental sore are primary flagellates of insects associated in one way or another with man, and for this reason he has studied some 20 species of insect flagellates and has worked out the life-histories of many of these.

He considers there is no ground for maintaining the genus *Leishmania*, for the work of LAVERAN and FRANCHINI has conclusively proved that more than one species of *Herpetomonas* parasitic in the insect can live and multiply in the organs of laboratory animals, in which they produce lesions exactly similar in every way to those of kala azar and oriental sore. It seems, however, that these experiments are not so conclusive as the author thinks, for the careful investigations conducted by HOARE [this *Bulletin*, Vol. 18, p. 185] do not lend support to this view, and raise doubts as to the accuracy of many of LAVERAN and FRANCHINI'S claims. Having decided that the name *Leishmania* must go, the author regrets that the name of LEISHMAN, the discoverer of the parasite, can no longer be associated with the parasite of kala azar. He accordingly suggests that kala azar should be known in future as " Leishman's disease," apparently overlooking the fact that there is no reason why the term leishmaniasis should no longer be employed. It seems to the reviewer that there is nothing to be gained by dropping the name *Leishmania*, which has been so long in use, especially as the complete life-cycle of the parasite is far from being completely understood.

As regards the flagellates of arthropods, the author points out that some of these appear to be parasitic only in the adults, while others are parasitic in the larvae as well. Infection is spread by the larvae or the adults ingesting rounded forms which have been passed in the faeces of the adults.

There are two possible methods of infection of man with the parasite of kala azar: by way of the alimentary tract or through the agency of blood-sucking insects.

The author has never been able to discover leishmania in the faecal mucus of cases of kala azar, nor has he been able to obtain any evidence that flagellate forms of leishmania will develop from such mucus. He has repeatedly failed to infect monkeys by feeding them with mucus, and is forced to the conclusion that the parasite of kala azar if passed in the faeces cannot possibly survive and later be ingested by a healthy person. This being the case, he is strongly of the opinion that the parasite of kala azar is a true insect Herpetomonas, and that it finds its way into the tissues of man through the agency of its insect host. The blood-sucking insects associated with man in such a kala azar area as George Town, Madras, are mosquitoes, sand-flies, fleas, lice, ticks, bugs. The claims of these various arthropods as possible vectors of the disease are considered in detail. In the author's opinion the bed-bug alone has any serious claim to be thus regarded, and the numerous experiments which he has carried out with this hemipteron are reviewed, as well as the unsuccessful ones made with other possible vectors. The bed-bug alone has given encouragement, for, as is well known, the leishmania ingested will develop into flagellates and the infection may persist as long as 41 days. It is stated that only a small percentage of bugs on becoming infected can remain so, and that this affords an explanation of the fact that kala azar is not more prevalent, although the bug abounds everywhere. As explained more fully in an earlier paper, this lack of correspondence is due to the small chance of an infected bug being transported to another locality. It seems to the reviewer that this argument ignores the possibility of spread of disease by the movement of infected human beings to other localities in which bed-bugs abound.

The methods by which the bug can carry infection to man are next discussed, and it is concluded that infection is spread by bugs being crushed on the skin. The production of CORNWALL's "thick-tail" forms in the stomach of the bugs is regarded as of importance as supplying the missing link in the cycle of development, which, in the author's opinion, has been completed by Mrs. ADIE's discovery of the intracellular development in the bug. He concludes that the discovery of the "thick-tail" form and Mrs. ADIE's observations supply the final proof that Cimex is the true invertebrate host of *Herpetomonas donovani.*

Under the heading "The Oriental Sore Problem," this disease is considered. According to the author, the parasite *Leishmania tropica* should be known as *Herpetomonas farunculosa* [? *furunculosa*], as it was first described by FIRTH in 1891. As regards the possibility of oriental sore protecting against kala azar, he states that he has known a case which contracted kala azar in Assam after suffering from oriental sore on the Indian frontier. The various possible vectors of oriental sore are considered in detail, and it is concluded that in Mesopotamia the disease is spread by Phlebotomus, and in Cambay in India by the bed-bug. In certain areas in Mesopotamia where oriental sore is common, bed-bugs do not occur. In Cambay, on the other hand, they abound. The reason for regarding the bed-bug as the vector in Cambay, and not Phlebotomus, which also occurs there, is that the parasite behaves in bugs like the parasite of kala azar. The author has been able, by means of a special technique, which is not described, to confirm Mrs. ADIE's discovery of an intracellular stage for the parasites of both oriental sore and kala azar. In spite of this it seems to the reviewer very improbable that if oriental sore is carried in Mesopotamia by the sand-fly it should have the bug as a vector in Cambay. It has to be remembered that the parasite of the Mesopotamian disease will also develop in the bed-bug.

It is impossible in a review of this length to consider all the arguments which the author adduces in support of his theories. Those who desire to form an accurate opinion of the views expressed must read the original article. One point, however, may be noted in conclusion. Having decided that the parasite of kala azar should be known as *Herpetomonas donovani,* and that of oriental sore as *Herpetomonas farunculosa,* it seems inconsistent that the names *Leishmania donovani, Leishmania tropica* and *Herpetomonas tropica* should be constantly cropping up in the paper. It appears as if the author himself finds it difficult to dispense with the habit of using the well-known terminology.

C. M. W.

PATTON (W. S.), LA FRENAIS (H. M.) & SUNDARA RAO. **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas.* **No. 8. Note on the Behaviour of** *Herpetomonas tropica,* **Wright, the Parasite of Cutaneous Herpetomonas** [sic] **(Oriental Sore) in the Bed Bug,** *Cimex hemiptera,* **Fabr. No. 9. Note on the Behaviour of** *Herpetomonas donovani,* **Laveran and Mesnil, in the Bed Bug,** *Cimex hemiptera,* **Fabricius.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 240–251. With 1 text fig. and 2 plates; & pp. 252–254.

In previous publications one of the authors (Patton) had shown that if a bug which had ingested leishmania from the peripheral blood of a case of kala azar was allowed to have another feed of blood the parasites which were still present in the bug disappeared in the majority of cases. Sometimes, however, a few of the organisms persisted. These are very difficult to find by direct examination. Accordingly the authors decided to test the persistence of the parasites in the bug by making cultures on N.N.N. medium.

The midgut of a bug which had ingested cultures of *Leishmania donovani* (the authors call it *Herpetomonas donovani*) and had no subsequent feed of blood was still infected on the thirty-first day, while the midgut and rectum of another similarly treated bug gave a positive culture on the thirty-fourth day.

As regards bugs which were fed on human blood after they had taken up cultures of *L. donovani*, the midgut of one gave a culture on the forty-first day and the hindgut of another on the thirty-fourth day. A bug fed as a nymph on a culture gave a positive result 34 days later in cultures from its midgut.

It is evident *L. donovani* can live in the midgut of a bug for a long time, even in spite of successive feeds of blood. The authors point out that they have made cultures from the alimentary tracts of 1,233 bugs, with the result that they have demonstrated that the normal tract of the bug is bacteriologically sterile.

C. M. W.

CORNWALL (J. W.) & LA FRENAIS (H. M.). **A Contribution to the Study of Kala-Azar (V.).**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 533–544. With 5 text figs.

With a view to obtaining corroboration of Mrs. ADIE's claim that *L. donovani* undergoes an intracellular development in the cells of the stomach of the bug, the authors have carried out a series of investigations on the behaviour of the organism in these insects. Bugs were fed on cultures of the parasite, and the alimentary tracts were examined at varying intervals. Not only was fresh material studied, but the entire stomach was fixed and examined in serial sections, with the object of obtaining information as to the relations of the parasite to the undisturbed cells. The freshly removed, unruptured stomach can be examined with high powers if it is slightly flattened under the cover slip. Though the flagellates could be seen moving in the contents, in no instance could parasites be seen within the cells. For the study of further detail the stomach was ruptured. In some cases flagellates or round bodies were seen apparently within cells, but there was no certainty that these had not accidentally entered damaged cells. It is noted that the multiplying nuclei of regenerating cells might readily be mistaken for bunches of parasites. The examination of smears stained by Romanowsky's method brought nothing to light as regards an intracellular phase.

In the stomach of some bugs the flagellates do not multiply freely, but die out in a few days. In others they persist, while in a small proportion the multiplication is incredibly great, so that the stomach and upper part of the gut become mere bags filled with a seething mass of organisms.

Examination of serial sections of the fixed stomach did not reveal anything in the way of an intracellular phase of development. It is pointed out that the cells of the stomach during active secretion are practically broken at the surface and are thus open to the invader. It is therefore possible for flagellates to penetrate these by accident, and though occasionally within such cells structures having the appearance of leishmania were seen, it was not possible to obtain conclusive evidence that they were not artefacts.

The thick-tailed form of the parasite originally described by one of the authors (Cornwall) from the stomach of bugs is discussed. It is concluded that it does not form an essential link in the cycle of development.

C. M. W.

ADIE (H. A.). **[Telegram announcing Finding Leishman-Donovan Bodies in Salivary Glands and Ducts of** *Cimex rotundatus*.]—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. p. v.

The following are the words of the telegram, reference to which is made in the letter "Kala-Azar and the Bed Bug," reproduced below:—

"Director on tour, so I inform you direct of swarming infection of Leishman-Donovan bodies found in salivary glands and ducts of *C. rotundatus* caught 24th instant on bed of suspected Kala-azar case in infected area. Dissected 26th instant. The discovery positively proves that the bed bug is capable of transmitting the disease through biting."

C. M. W.

WENYON (C. M.). **Kala-Azar and the Bed Bug.** [Correspondence.]—*Lancet.* 1922. Feb. 25. pp. 400–401.

"The announcement in the *Indian Journal of Medical Research* for January, 1922, of a telegram, received from Mrs. Adie, stating that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of *Cimex rotundatus* caught in the bed of a suspected kala-azar case, and that this discovery positively proves that the bed bug is capable of transmitting the disease through biting, raises once again the whole question of the transmission of this disease. In the light of the announcement it may be well to review the various investigations which led to the bed bug being accused of transmitting kala-azar, and to weigh the evidence which has been adduced in favour of this hypothesis, for, however probable it may be, it must always remain a hypothesis till the actual transmission experiments have been carried out. The announcement, to which you drew attention in an annotation in THE LANCET of February 11th, may lead to the hasty conclusion that the method of transmission of the disease by the bed bug has at last been solved.

"When kala-azar first became known as a distinct disease in India after the investigations of Leishman, Donovan, Rogers, and others, attention was turned to the discovery of a vector. It was realised that kala-azar was a house disease and Rogers and many others considered the bed bug as a possible agent. This elusive insect is admirably suited to play a part in the spread of infections. It does not live on its host but sucks his blood at night, returning in the daytime to any shelter it may find. It ingests a large quantity of blood on which it may survive for long periods without further feeding. Every time it feeds, it may do so on a different individual, while it is easily transported from place to place in bedding or furniture. In spite of these facts, though the bug has been accused of carrying many diseases, it has never been proved to carry any one of them.

"That the bug was suspected as being the carrier of kala-azar was only natural, but against this view is the very strong argument that the disease in India is peculiarly limited in distribution, while the bed bug occurs everywhere. In order to obtain more definite evidence, Patton turned his attention to the behaviour of the Leishman-Donovan body in the bug. He demonstrated the presence of Leishman-Donovan bodies in the peripheral blood of cases of kala-azar and proved that bed bugs fed on these cases ingested parasites with the blood they imbibed. Your notice in last week's LANCET suggests that the scantiness of parasites in the peripheral blood argues against any invertebrate vector acquiring infections from this source. It has been demonstrated that cultures, which ultimately contain thousands of flagellates, can be obtained from a few drops of finger blood, and we have no reason to suppose that the invertebrate vector, whatever it may be, may not obtain from the blood a sufficient number of parasites to lead to its infection. Patton was able to prove that the organism ingested from the peripheral blood of cases of kala-azar developed in o a fully formed flagellate in the stomach of the bug, as Rogers had shown it did in the culture tube. This fact was regarded as proof that the bug was the carrier of kala-azar. It was, however, discovered by the writer that other flagellates, such as the rat trypanosome, were also able to undergo a development in the bug, and furthermore, that the parasite of oriental sore of Bagdad, a disease which is certainly not carried by the bug, also developed into flagellate stages in this insect. It was concluded, with ample justification as subsequent investigations prove, that the stomach of the bug could act merely as a culture tube on account of the large quantity of slowly digesting blood it contained and that the mere fact that the Leishman-Donovan body became a flagellate in the stomach of the bug was in itself no proof that this insect was its natural host. This conclusion has received support from experiments conducted subsequently by Patton himself. He has investigated the length of time the flagellates can persist in the bug and has proved that those developed from the Leishman-Donovan body may still be present 41 days after the parasites were first taken up. He has, however, shown that other flagellates, of which the bed bug cannot possibly be a host, such as those of the flea and house-fly, can survive in the bug for even a longer period. The mere persistence of the Leishman-Donovan body in the bug has thus taken us no further towards arriving at a final verdict.

"The next step was the announcement by Mrs. Adie last year that the Leishman-Donovan body, after being taken up by the bug, actually entered the cells of the stomach and there underwent a development comparable with that which is known to take place in the case of the rat trypanosome during its development in the flea. It is unfortunate that this process was only observed in dead bugs in which the cells of the stomach must evidently be in an unnatural condition and subject to invasion by organisms in a manner which would not occur in life. Patton states that he has confirmed these observations, but here again it is not clear that the intracellular stages were observed in living bugs. Nevertheless, he claims that 'this is the final proof that Cimex is the true invertebrate host of *Herpetomonas donovani.*' It is maintained that the flagellate enters the cell of the stomach and there becomes the 'thick-tailed' form, which was first described by Cornwall; and that this proceeds to multiply within the cell. No details of Patton's technique are known, but . . . [from Mrs. Adie's illustrations] it is far from clear* . . . that all the forms . . . are really Leishman-Donovan bodies, or developmental stages of these. Some of them have the appearance of parasites of a different nature entirely—possibly sporozoa—and that other parasites may be present is proved by the fact that nematode larvæ occurred in these bugs. It is useless to speculate as to how the latter gained entrance to the bugs, but it is clear that observations made on bugs which have been dead some days and which have other concurrent infections cannot be employed or must be employed with the utmost caution in making deductions as to what happens to the Leishman-Donovan body under natural conditions. From Mrs. Adie's results and his own confirmations of these, together with the fact that he has never found the least evidence of a salivary gland infection during the many years he has investigated the subject, Patton comes to the conclusion that the parasite is transferred to man by the bug being crushed on the skin and not by the bite of the bug.

" It is difficult to judge of the significance of the intracellular stages in the bug, but one must be cautious in concluding that what occurs in dead cells is an indication of what will occur in life. Neither Mrs. Adie nor Patton has obtained evidence of the intracellular stage in living bugs, and it seems not improbable that just as the flagellates of the flea and house-fly were shown to persist in the bug as long as, or even longer than, the parasite of kala-azar, so intracellular stages would occur in the case of dead or dying cells. The observations of Mrs. Adie and Patton were made on crushed material examined fresh and in smears, a method which gives very erroneous ideas of the true relation of parasites to cells. It is highly significant that in the same number of the *Indian Journal of Medical Research,* Cornwall describes experiments he has made with bugs with the object of confirming Mrs. Adie's observations. Cornwall employed live bugs fed on cultures and the stomachs were fixed entire and sectioned without disturbing the cells. Though heavy infections of the stomach occurred, he could not obtain the slightest evidence of any intracellular stage. Furthermore, he concludes that the 'thick-tailed' form first described by him and upon which Mrs. Adie and Patton lay so much stress, is merely an abnormal form and has no place in the true life-cycle of the parasite. It is clear, therefore, that there is no real evidence that an intracellular stage occurs during the development of the Leishman-Donovan body in the living bed bug and that the stages which have been found in the dead bugs may be merely a culture of the flagellate in dead or dying cells, and, as already remarked, it is not improbable that other flagellates may behave in a similar manner under like conditions. Patton's statement, therefore, that 'the final proof' has been obtained seems premature.

" We now come to the last stage—namely, the announcement contained in Mrs. Adie's telegram that Leishman-Donovan bodies have been found in the salivary glands of the bug. If this is correct,* then Patton's carefully argued conclusion expressed in the same number of the *Journal* that infection is spread by the crushing of the bug on the skin will hardly be necessary. On Mrs. Adie's observation itself it is difficult to form an opinion from the few details which the telegram contains. In the first place, it is evident that the bug came from the bed, not of a case of kala-azar but only a suspected case, and there is no proof that the bug had even fed on this particular individual. Furthermore, it is quite clear that the statement that the parasites in the salivary glands were actually Leishman-Donovan bodies requires proof. It is notoriously difficult to identify flagellates of this kind. Those which produce kala-azar and oriental sore are often indistinguishable from purely insect flagellates which give rise to no disease and are never parasitic in vertebrates. However closely the salivary-gland forms seen by Mrs. Adie resembled the parasites of kala-azar, it is impossible that she can have obtained proof, from the single observation, that she was actually dealing with what she supposes the organism to be. It is quite possible that the bed bug may occasionally harbour a flagellate of its own, though, if this be so, Mrs. Adie is the first to discover such an infection. Flagellates resembling the Leishman-Donovan body occur in many arthropods. They are mostly parasites of the intestine but occasionally invade the body cavity, salivary glands, and other organs, while in one case a development in the cells of the stomach has been described. It is possible that Mrs. Adie was dealing with a rare infection of this kind.* As an illustration of the confusion to which such an organism may give rise, we have only to remember the natural flagellate of the tsetse-fly which was frequently mistaken for developmental stages of pathogenic trypanosomes in Africa. The fact that the flea harbours a flagellate very similar to that of kala-azar has often led to the latter being regarded as the kala-azar parasite itself and to the view that Mediterranean kala-azar is transmitted by the flea.

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* Since writing this letter the reviewer has received reliable information from India that the bodies seen by Mrs. Adie in the salivary glands were not Leishman-Donovan bodies. They are possibly yeasts or the microsporidian Nosema, the infection with which was not limited to the salivary glands but occurred in all the tissues of the body.

" The fact that thousands of bugs have been dissected during kala-azar investigations without a single instance of a natural flagellate of the bug being discovered may suggest that Mrs. Adie was actually observing the parasite of kala-azar. On the other hand, thousands of bugs which have taken up the parasite of kala-azar, or have had opportunity of doing so, have also been examined without evidence of salivary-gland infection by the parasite being found. . . . Whether Mrs. Adie was dealing with a harmless flagellate of the bug or a developmental stage of the Leishman-Donovan body it is evident that a salivary-gland infection is of very rare occurrence. The observation is undoubtedly a valuable one and may be very suggestive in view of the fact that the bug, as far as we know, rarely feeds on anything except human blood, but unfortunately the final proof of the nature of the flagellate is lacking and cannot be obtained till many more similar instances have been seen. If it could be demonstrated that laboratory-bred bugs which ingest Leishman-Donovan bodies from the peripheral blood of cases of kala-azar show developmental stages in the stomach and within the cells of this organ, and that this is followed by an infection of the salivary gland, then there would be great presumptive evidence in favour of regarding the bug as the vector, though the final proof could only be obtained by the actual transmission of the disease. Up to the present this has not been done.

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* At the Indian Science Congress held at Madras, February 1922, there was a discussion in the Medical Research Section on Kala Azar, in which many members took part. The following is extracted from the *Lancet*, Mar. 25, 1922, p. 603:—

"Colonel E. D. W. Greig read a communication from Mrs. Adie on the new bodies which she had discovered in the salivary glands of the bed-bug. . . . . The general impression . . . . was that the bodies demonstrated . . . . could not be accepted without further study, and Colonel W. Glen Liston pointed out that the bodies were similar to those found by the Plague Research Commission in the salivary glands of the flea. The discussion was summed up by Colonel Greig, who pointed out that the problem of kala-azar was far from being solved."

That opinion in India is still undecided is borne out by the fact that in this one number of the *Indian Journal of Medical Research* we find that, as a result of the discovery of the so-called intracellular stages, Patton considers that the final proof that Cimex is the invertebrate host has been obtained, and that infection occurs through the crushing of the bug on the skin, Mrs. Adie wires that her discovery positively proves that the bed bug is capable of transmitting the disease through biting, while Cornwall suggests that it would be well to give the bed bug a rest in connexion with leishmaniasis and that some other possible vector be carefully investigated. From an epidemiological point of view, there is something to be said in favour of the bed bug hypothesis, but the wide distribution of the bug compared with that of kala-azar is against it. Patton believes that the fact that only a small percentage of bugs are able to become infected and remain so explains why the distribution of the bug does not correspond with that of kala-azar—presumably because there is only a remote chance of infected bugs being transferred from place to place. This argument seems to ignore the fact that disease is rarely spread by the transportation of infected insects, but by the movements of already infected human beings. Cases of kala-azar have constantly moved from the endemic centres in India to other places where it does not exist, and though in these bed bugs abound, the disease has never become established. This is one of the most puzzling features of kala-azar, and if the ubiquitous bug should prove to be the vector, it will be very difficult to explain why the disease is limited to special endemic foci.

"We may conclude, therefore, that the bed bug, though a suspected agent, still awaits the final verdict, and that unless more tangible and convincing evidence is forthcoming the jury will certainly disagree. Every credit is due to the prosecution for their most careful and exhaustive inquiries which have extended over many years, and which have been stimulated by a desire to rid the world of a harmful parasite, but the elusive bug, which has been acquitted of so many charges, has so far escaped sentence in the case of kala-azar also."

FRANCO (Enrico E.). **Etudes sur les leishmanioses. Travaux de l'Institut de Pathologie Générale et d'Anatomie Pathologique de l'Université de Lisbonne.**—Reprinted from *Jl. Sciências Matemáticas, Fisicas e Naturais.* 1921. 3rd Ser. No. 8. 8 pp. With 1 map.

That infantile kala azar occurred in Portugal was first noted by ALVARES, who recorded a case from Lisbon in 1910. The author of the paper under review has collected data of 33 cases which have been seen in the country. Details of these are given in a table and their distribution is shown on a map. The ages varied from nine months to nine years, but only two of the cases were over six years of age. All the cases occurred in Lisbon itself or in its immediate vicinity.

Though oriental sore occurs in Spain, as first noted by CAMACHO (1914), no indigenous case has been seen in Portugal.

C. M. W.

MILIO (Giulio). **Sulla diffusione della leishmaniosi interna a Messina e dintorni.** [Distribution of Infantile Kala Azar in Messina and Neighbourhood.]—*Pediatria.* 1921. Dec. 15. Vol. 29. No. 24. pp. 1109–1119.

During the year 1920–21, 900 children were seen at the clinic at Messina. Amongst these there were 32 cases of kala azar, giving a percentage of 3·5. The cases came not merely from the towns, but also from the smaller villages, and their distribution was so general that it was impossible to obtain evidence of any special centres of infection. The paper gives short histories of the cases.

In 12 cases it was possible to carry out treatment by intramuscular injections of stibacetin. Of these three died, five were cured, and four were progressing favourably. The number of injections required to effect a cure varied from 20 to 31.

C. M. W.

NICOLLE (Ch.). **Addendum au mémoire : Chronique du Kala-Azar en Tunisie. Tome 1, fascicule 1, page 33.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. p. 345.

This note corrects an omission which was made in the author's account of kala azar in Tunis. It was there stated that the first Tunisian case was made known by CATHOIRE. As a matter of fact the discovery was made by LAVERAN, who found Leishmania in a spleen smear which had been sent to him by CATHOIRE (this *Bulletin,* Vol. 18, p. 238).

C. M. W.

FOX (E. C. R.) & MACKIE (F. P.). **The Formol-Gel Test in Kala Azar.** —*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 374–375.

The authors have devised a simple method of carrying out the " formol-gel " test in kala azar. "The blood from the finger is collected in a Wright's capsule, as for a Widal test. When the serum has separated a drop is placed on a slide and inverted over a watch glass containing a few drops of commercial formalin. In cases of kala azar the serum will solidify in a few minutes, while other sera will remain unaffected. The solidified serum is opaque and in the form of a stiff jelly which adheres to the slide, whilst in negative cases it will run off the slide when tilted."

A positive result was obtained in 20 cases of known kala azar. In 19 cases of syphilis a positive result was seen in two cases, but no details of the histories of these were known. Of four cases of malaria, one gave a positive result, but this was a case actually undergoing examination because of suspected kala azar. Six other controls were quite negative.

As the authors remark, the value and limitations of this test have yet to be determined.

C. M. W.

SIA (Richard H. P.). **Ray's " Hemolytic " Test in Kala-azar.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 397–399.
—— & HSIEN WU. **Serum Globulin in Kala-azar.**—*China Med. Jl.* 1921. Nov. Vol. 35. No. 6. pp. 527–532.

The author applied RAY's test to 86 patients suffering from various diseases, including 16 cases of kala azar. The test is carried out by adding 20 cmm. of blood to 6 cc. distilled water in test-tubes 7–8 mm. in diameter. The mixture is thoroughly shaken, and a reading is made at the end of five to ten minutes. It was found that in all the kala azar cases, and in no others, the mixture remained turbid and formed a flocculent precipitate on standing. Amongst the negative cases there were 10 of anaemia with haemoglobin ranging from 30 to 60 per cent.

In the second paper are described experiments made with the object of testing RAY's contention that the precipitate is due to incomplete haemolysis of the red cells. It was found that, using saponin as a haemolytic agent, kala azar serum did not protect red cells against haemolysis any more than normal serum. It was found, however, that kala azar serum alone produced a precipitate when mixed with distilled water, and chemical analysis of the precipitate showed it to be serum globulin. The globulin content of kala azar blood was found to be higher than in any other disease, and it is proposed to call the test the globulin precipitation test for kala azar.

C. M. W.

NAPIER (L. E.). **Kala-Azar: Notes on the Diagnosis and Treatment.**—*Indian Med. Gaz.* 1921. Nov. Vol. 56. No. 11. pp. 401–404.

This paper is a general account of kala azar as it occurs in Bengal. The disease is much more prevalent in Calcutta and the surrounding districts than is generally supposed. Of the patients who apply at the kala azar clinic at the Calcutta School of Tropical Medicine, about 70 per cent. are found to be definite cases of the disease. Both sexes are equally liable, and Hindus, Mohammedans and Christians are affected to the same extent. The patients are of all ages, from one to 60 years. The signs and symptoms of the disease are most characteristic at the ages of 4 to 14, and most severe between 14 and 24. . In men, and to a less extent in women, over 35 a diagnosis from clinical signs alone is extraordinarily difficult to make. Frequently the only symptoms are long-continued fever unrelieved by quinine and spleen enlargement, and even the latter may not be marked. Although there are many cases which one can, on clinical evidence alone, definitely diagnose as kala azar, it is never safe to conclude that any case with enlarged spleen is not suffering from the disease. Except in a very small percentage of cases the final diagnosis must be made by the discovery of the parasite. In a very large number of cases diagnosis can be made by the culture method, but this is not a practical method during the hot weather in Calcutta. Spleen puncture, which the author has performed on some hundreds of cases without any accident, is the more usual method of diagnosis. The author gives a description of the technique employed by him in carrying out this operation.

The most accepted form of treatment is with tartar emetic. Though it is supposed that the potassium salt is more toxic than the sodium salt, this is not the author's experience, while he finds the potassium salt more efficacious. He uses a 1 per cent. solution, prepared fresh in normal saline at least every three days. If it is inconvenient to prepare a solution so frequently, it can be preserved by adding carbolic acid to the strength of 0·5 per cent. The first dose should be 1 cc., and this is increased by 1 cc. at each injection till a dose of 10 cc. is reached. If at any dose there are unpleasant symptoms, on the next occasion the dose should not be increased, and if the symptoms continue, the dose is decreased. The injections should be given three times a week. For debilitated patients and children the initial dose should be 0·5 cc., increased by 0·5 cc. at each injection. It will usually be found that for children up to 10 years of age the dose should not go beyond 5 cc. Details of the method of administering the drug intravenously by means of a syringe are given. As regards the duration of treatment, the author considers that for an adult who responds readily a total of 2 gm. of the drug is sufficient. If, however, there has been a delay in the fall of the temperature, this should be increased to 3 gm. In no case should the treatment be discontinued till the white blood count has become normal. As subsidiary treatment it is advisable to put all patients who are at all debilitated on a digitalis mixture of some kind. That used by the author is :—

Tinc. digitalis	min. 5
Tinc. nux vomica	min. 5
Tinc. rhei co.	min. 20
Tinc. card. co.	min. 15
Aq. chloroformi	ad ½ oz.

The mixture is given for a few days before commencing antimony treatment and may be continued for the first few weeks. After this a mixture containing iron and quinine is useful, as malaria and kala azar often co-exist.

If the patient is very weak in condition when first seen it is usually advisable to withhold antimony treatment for a short time, during which an intramuscular injection of the following mixture can be given :—

Turpentine	1 part.
Creosote	1 ,,
Camphor	1 ,,
Olive oil	2½ parts.

The best site for the injection is in the gluteal region. It may cause some pain and even abscess formation, but this will have the beneficial effect of inducing a leucocytosis. Unfortunately the author omits to mention the quantity of the mixture to be injected. The injection is also described as being very useful during the course of antimony treatment when a patient who at first responds well commences to run a daily temperature of 100° F., followed by a rapid fall to normal.

C. M. W.

KLIPPEL & MONIER-VINARD. **Premier cas de kala-azar d'origine marocaine. Guérison par l'acétyl-aminophényl stibinate de soude (stibényl).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 76–85. With 1 chart in text.

This paper gives a detailed description of a case of kala azar in a hospital nurse 20 years of age. It is of interest as being the first human case recorded from Morocco, where the canine disease has been known to occur since its demonstration there by DELANOË and DENIS in 1916.

When the diagnosis was made the patient was much emaciated and was suffering from repeated attacks of fever. The disease was evidently well advanced. Treatment was commenced by oral and intramuscular injections of tartar emetic, which did not bring about any improvement. Intravenous injections of stibacetin were then made as follows :—July 20, 5 cgm. ; July 22, 12 cgm. ; July 24, 20 cgm. ; July 26, 30 cgm ; July 28, 20 cgm. ; July 31, 12 cgm. The patient by this time had shown such marked improvement, with complete disappearance of the fever, that she was taken to the country, where the treatment was continued during August by giving, at four days' intervals, three injections of 20 cgm. and two of 30 cgm. Treatment was then withheld for three weeks, but was resumed on September 11, between which date and the 28th of the same month the following injections in centigrams were given :—30, 40, 50 and 40.

The patient made an uninterrupted recovery, and at the time of writing appeared to have been quite cured. At no time during the treatment did the injections produce any signs of intolerance, and the authors consider that stibacetin is a drug of remarkable therapeutic properties in the treatment of kala azar.

C. M. W.

MALLARDI (Mario). **Il ricambio dell'antimonio nella Leishmaniosi interna.**—*Pediatria.* 1921. Oct. 1. Vol. 29. No. 19. pp. 878-885.

DI CRISTINA and CARONIA (1916) stated that in three cases of infantile kala azar treated by intravenous injections of tartar emetic the urine became free from all traces of antimony in three days. In the present paper the author gives an account of the antimony excretion in four cases of the disease, which were treated either intravenously with tartar emetic or intramuscularly with stibacetin. The elaborate method of detecting antimony in the urine is fully described.

The results obtained, which are of importance from the point of view of the possibility of accumulation of antimony in the body, were as follows :—

If the case is one in which the condition is fairly good at the commencement of either treatment the antimony is completely eliminated from the body after two or three days. On the other hand, if the case is one in which the general condition is bad and injections of antimony have been administered for some time, it will be found that the excretion of the drug is retarded, the urine not becoming free till after the lapse of five to eight days. This is due to the defective metabolism of the body and to the decrease in the number of parasites, which have the property of breaking up the drug and thus facilitating rapid elimination.

These experimental results have a practical application. In the early stages of the treatment of cases which are not markedly debilitated it is safe to give injections every second day, but cases which have run a long course before treatment was commenced are less tolerant of the drug, which, owing to its less rapid excretion, must be given at longer intervals.

C. M. W.

MALLARDI (Mario). **Degenerazione cistica della milza nel corso della leishmaniosi interna.** [Cystic Degeneration of the Spleen in Infantile Kala Azar.]—*Pediatria.* 1921. Oct. 15. Vol. 29. No. 20. pp. 934-937.

The case recorded is one of infantile kala azar in Italy, in which there appears to have been a cystic degeneration of the spleen. The child had been treated vigorously with stibacetin, and when first seen by the author was not progressing favourably, owing to accumulation of antimony in the body. The treatment was suspended till all antimony had been eliminated. Intravenous injections of tartar emetic in small doses was then commenced, with the result that a complete cure was effected. A puncture of the spleen on one occasion resulted in the abstraction of a clear limpid fluid, which contained only degenerating leucocytes, while blood from the spleen showed large numbers of parasites. It is concluded that the fluid was an indication of cystic degeneration of the spleen, such as may occur in malaria or myelogenous leukaemia.

C. M. W.

LEGROUX (Rene) & JIMENEZ (J.). **Facteur des croissances dans les cultures de** *Leishmania donovani.*—*C.R. Acad. Sci.* 1921. Dec. 19. Vol. 173. No. 25. pp. 1423–1425.

Experiments were conducted with the object of obtaining information on the nature of the active principle in N.N.N. medium which favours the growth of leishmania. Medium prepared with washed red cells gave no growth. The separated serum sometimes gave good results, at other times less favourable results. It was thought that this difference might depend upon the degree to which the white blood cells had been broken up during the process of defibrinating the blood.

Investigations of macerated organs of the body were then tested. After maceration at a temperature of 75° C. for 20 minutes, the liquid was separated and freed from any bacteria by filtration. In the case of the spleen and bone marrow filtrates good cultures resulted, while with that obtained from other organs there was either a poor growth or no growth at all. If during maceration a higher temperature, 90° or 100° C., was employed culture did not take place in the subsequently prepared medium. The authors point out that the leishmania appear to require a substance which can be extracted from leucocytes at a temperature of 75° C. and that this substance is destroyed at temperatures approaching 100° C. Similar results were previously obtained by them when working with the bacillus of influenza.

C. M. W.

JEMMA (G.). **Cultura dei parassiti di Leishman dal sangue periferico e coltivabilità do essi in terreni con sangue umano.**—*Pathologica.* 1922. Feb. 1. Vol. 13. No. 317. pp. 71–73.

The investigations recorded in this paper were undertaken with the object of testing the view expressed by GIUGNI that in making cultures of leishmania from the peripheral blood of cases of kala azar the human serum itself often exerted an inhibitory influence on the growth of the flagellates. CARONIA and CANNATA, on the other hand, considered that the frequent failure to obtain cultures was due to the scarcity of the parasites in the peripheral blood.

The author prepared media with the blood of rabbits and human beings of various ages and made comparative cultures in the two media. As a result of his experience he concludes that the most usual cause of failure to obtain culture from the peripheral blood is the scarcity of parasites, that human blood does not, as a rule, hinder growth, but that the blood of certain individuals does exert a retarding effect.

C. M. W.

PEDROSO (Alexandrino). **Biologia da Leishmania.**—*Bol. Soc. Med. Cirurg. de S. Paulo.* Brazil. 1921. May. Vol. 4. Ser. 2. No. 3. pp. 33–34.

1. In experiments performed with the object of testing whether Leishmania develops under anaerobic conditions the results were negative.

2. In examining the various ingredients of NICOLLE's medium necessary for the adequate development of Leishmania the following points were observed :—

(*a*) That the rapidity and intensity of the culture increases in proportion to the quantity of blood up to 15 per cent., the point of maximum development, after which there is no notable variation up to 30 per cent. ; from 30 per cent. onwards it becomes useless and even prejudicial.

(*b*) That a percentage of 0·3 to 0·4 of NaCl is more favourable to initial development than the percentage in the usual medium.

(*c*) That the best formula for culture medium is the following :—

Water	1 litre.
Agar	20 gm.
NaCl	3 to 4 gm.

(*d*) That there is a disadvantage in mixing blood and agar at 56° C.

(*e*) That the addition of 0·8 cc. of N/10 HCl appears favourable to growth, which does not take place with the addition of 1·0 cc. and over.

(*f*) That with acid media, as with alkaline, it is easy to distinguish tubes in which Leishmania cannot grow, as the excessive acidity or alkalinity changes the colour from red to dark.

(*g*) That the development of Leishmania is in proportion to the acidity or alkalinity of the media and that in slightly acid or alkaline media the latent period tends to be shorter.

3. Leishmania develop in media not containing haemoglobin.

(*a*) Leishmania live a few hours in pure human serum, and in sheep-, rabbit-, dog-, and goat-serum.

(*b*) In the same serum prepared according to the process of LEEFDLER [? LOEFFLER], with physiological solution instead of broth, Leishmania dies within one or two days, except in the case of goat-serum, in which it remains alive for the greatest length of time.

C. M. W.

SERGENT (Ed. et Et.), PARROT (L.), DONATIEN (A.) & BÉGUET (M.). **Transmission du clou de Biskra par le phlébotome** (*Phlebotomus papatasii*, **Scop.**).—*C.R. Acad. Sci.* 1921. Nov. 21. Vol. 173. No. 21. pp. 1030–1032.

The authors point out that the Sergents suggested in 1905 that Phlebotomus was the probable vector of oriental sore at Biskra. WENYON in 1911, and PATTON in 1919, considered this fly as a likely carrier in Mesopotamia. The experimental proof of this hypothesis was, however, lacking.

During the summer of 1921 the authors instituted an experiment with the object of testing the possibility of the carriage of the disease by sand flies which were collected at the endemic foci of Biskra, El-Outaya and El-Kantara, and despatched on a three to four days' journey to the Pasteur Institute in Algiers, where oriental sore does not occur. In all, 2,346 flies were sent, and these comprised *P. papatasii* 2,282, *P. perniciosus* 8, and *P. minutus* var. *africanus* 56. Of these, 559 which reached their destination alive were divided into 23 batches. As they refused to feed they were crushed in saline solution, which was subsequently used to inoculate volunteers by scarification of the skin of the arm. One experiment was positive. This resulted from a batch of 7 *P. papatasii*, the only survivors of 94 flies captured at the military hospital of Biskra on August 16 and 17, 1921. On August 20, the 7 flies were crushed in saline at Algiers and inoculated in the skin of the arm. The wound healed without any trouble. On November 13, 2 months and 24 days later, a small papule was noted at the same spot. On the following day examination of the papule revealed numerous leishmania and the picture characteristic of oriental sore. It is concluded that the sand-flies from endemic foci of oriental sore can harbour a virus which will produce in man a cutaneous leishmaniasis which resembles oriental sore both clinically and pathologically.

C. M. W.

ARAGÃO (Henrique de Beaurepaire).—**Transmissão da Leishmaniose no Brazil pelo** *Phlebotomus intermedius.—Brazil Medico.* 1922. Mar. 18. Year 36. Vol. I. No. 11. pp. 129–130. With 1 fig.

Influenced by the successful transmission of oriental sore by means of *Phlebotomus papatasii* by the brothers SERGENT and their collaborators, whose paper is reviewed above, the author of the present note carried out similar experiments with the Brazilian fly, *Phlebotomus intermedius,* Lutz and Neiva. The work was undertaken in an endemic centre of leishmaniasis in Brazil, where *P. lutzi* could be easily obtained. Flagellates resembling culture forms of leishmania were found in the flies. On October 28, 1921, five flies which had fed upon a case three days before were crushed in saline solution and the emulsion inoculated in the skin of a dog's nose. At the end of January, 1922, there was some evidence of reaction at the site of inoculation. A small nodule developed in which scanty, but absolutely typical, leishmania were found on February 10. The nodule broke down and gave rise to a small ulcer which is shown in a photograph of the dog's head which illustrates the paper. The author remarks that it is evident that *Phlebotomus intermedius* is capable of carrying the virus of *Leishmania tropica.*

[In both this experiment and that conducted by SERGENT and his co-workers the successful inoculation proves that the virus of oriental sore can survive in the fly for three days. In Aragão's experiment the flies actually fed on a case three days before, while in that conducted by the French observers it is just possible, though perhaps improbable, that one or more of the flies had actually fed on a case shortly before they were caught at Biskra. Without wishing to be hypercritical it seems to the reviewer that the absolute proof that the fly was not merely acting as a mechanical carrier has not been obtained. It is probable that crushed bed bugs would give rise to a sore if an interval of only three days had elapsed since they had fed on a case of the disease.]

C. M. W.

PARROT (L.). **Recherches sur l'étiologie du bouton d'orient (clou de Biskra). Etudes sur la biologie des phlébotomes en milieu endémique.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 80–92.

This paper, which is mainly entomological, contains an account of investigations into the bionomy of species of Phlebotomus in the endemic focus of oriental sore in the neighbourhood of Biskra. The enquiry was made on account of the increased importance of these flies resulting from the positive production of oriental sore by means of a virus obtained from *P. papatasii,* an account of which is given above. The habit of *P. minutus* var. *africanus* of feeding on the gecko (*Tarentola mauritanica*) is noted, and reference is made to the suggestion that the gecko may possibly harbour the virus of oriental sore. It is stated, however, that there are reasons for suspecting that *P. papatasii* may be the chief, if not only, carrier of the disease. The method of feeding of the flies is noted, and it was observed that *P. minutus* var. *africanus*, while biting, constantly passed drops of clear fluid per anum which became distributed on the skin. This habit may be possessed by other species and the possibility of its affording an explanation of the method of dissemination of intestinal flagellates is emphasized.

C. M. W.

CORNWALL (J. W.). **Note on the Histo-Pathology of a Non-Ulcerated Oriental Sore.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 545–547.

From the study of sections of an oriental sore the author comes to the following conclusions as to the course of events in the development of a sore. The parasite is probably introduced into the dermis, for not a single cell of the epidermis was found infected. The parasites are not found in the cells of the sweat glands, sebaceous glands or hair follicles. The mononuclear endothelial cells are the breeding ground of the parasite, and these large cells proliferate extensively and push their way in all directions, especially towards the surface of the skin. The fibrous tissue of the dermis is split apart by columns of invading cells and becomes a mere network. New capillaries are formed to meet the requirements of the new tissue. When the endothelial cells reach the Malpighian layer of the epidermis the latter becomes reduced to a thin membrane, the slightest injury to which admits pyogenic organisms and commences the ulcerative process. The ulceration is regarded as a curative process and prevents the lateral spread of the parasites and the consequent destruction of large areas of the integument. At the periphery of the lesion are small cells with round, deeply-staining nuclei. Some of these are plasma cells, others migratory cells. There appear to be no extravascular polynuclear leucocytes. The small cells surrounding the lesion have some influence in limiting its extension.

C. M. W.

MCKINSTRY (W. H.). **A Serological Investigation of Oriental Sore.**—*Brit. Med. Jl.* 1922. Feb. 4. p. 185. & *Jl. Roy. Army Med. Corps.* 1922. Mar. Vol. 38. No. 3. pp. 216–217.

Owing to the fact that very discordant statements have appeared in the literature relating to the occurrence of a positive Wassennann reaction in oriental sore, the author tested 28 cases of the disease by the technique adopted at the Military Hospital, Rochester Row. Although the cases were in all stages of the disease, in only one was a positive Wassermann reaction obtained, and this one was suffering from concomitant syphilis. In all the cases except one diagnosis was established by the finding of the parasite.

C. M. W.

CARTRON & BACQUÉ. **Notes sur le clou de Biskra chez les tirailleurs sénégalais à Biskra (Algérie).**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. July–Aug.–Sept. Vol. 19. No. 3. pp. 303–319.

Amongst the Senegalese garrison stationed at the oasis of Biskra oriental sore was a serious cause of invaliding. It was especially noted amongst those who had passed the months of July, August and

September in this endemic focus of the disease. The incubation period was usually about one month.

After various treatments had given unsatisfactory results, heliotherapy was tried. The sun was allowed to act on the sore directly or with the help of a biconvex lens. Applications of ointment of oxide of zinc (10 in 35) or methylene blue (1 in 20) were made at the same time. A permanent cure resulted in about a month, whereas other treatments required three, six, or even nine months to produce healing.

C. M. W.

CALICETI. [**Cutaneous Leishmaniasis.**] — *L'Oto-Rhino-Laryngologie Internationale.* 1920. Dec. [Summarized in *Brit. Med. Jl.* (Epitome of Current Med. Literature). 1922. Jan. 21. p. 11.]

Two cases of Sicilian oriental sore treated by local injections of emetine hydrochloride are recorded. Each case, which had lesions on the ear and nose, received two injections of 8–10 cgm. of the drug, and cure resulted in three weeks. In the two cases it was found that the blood contained antibodies, and deviation of the complement was obtained by using an antigen extracted from the spleen of a kala azar case. No reaction resulted when the antigen employed in the Wassermann test was used.

C. M. W.

DE AGUIAR PUPO (João). **Duos formas raras de leishmaniose tegumentar : lymphangite leishmaniosica simulando a esporo-trichose ; leishmaniose maligna numa crianca de 3 annos.** [Two Rare Forms of Cutaneous Leishmaniasis : Leishmanial Lymphangitis simulating Sporotrichosis ; Malignant Leishmaniasis in a Three-year-old Child.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. June. Vol. 4. 2nd Ser. No. 4. pp. 97–99. With 3 plates.

The paper describes two cases of cutaneous leishmaniasis seen in Brazil. The first case, in a man of 47 years of age, is remarkable in the extensive involvement of the lymphatics of the leg. A primary lesion occurred above the ankle, and from this the lymphatics running up the leg became infected. A series of nodules developed in a line between the primary lesion, which had healed, and the knee. These nodules had broken down and produced a row of large ulcers, in which leishmania were demonstrated.

The second case was in a child three years old. There were numerous ulcers about the face, arms and legs, as well as involvement of the nasal mucosa.

The first case was treated with tartar emetic, with excellent results, and the second with disodoluargol, which produced healing of all but the mucosal ulcers of the nose. The latter condition improved appreciably after antihelminthic treatment directed against a concomitant ankylostome infection.

C. M. W.

MEHRDORF (Robert). **Ueber Espundia.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 1. pp. 1–5. With 1 plate.

Writing of espundia in Brazil, the author calls attention to a type of the disease which he names *Espundia hypertrophicans,* on account of the large granulomatous tumours which are produced. These may occupy an area as large as the palm of the hand, and because of their cauliflower appearance may be mistaken for cancer of the skin. Attention is drawn to the frequency of involvement of the nasal and buccal mucosae, which always occurs as a secondary complication of the purely cutaneous lesion. The paper is illustrated by six photographs showing various types of lesion met with.

C. M. W.

i. REMLINGER (P.). **Un cas de Kala Azar infantile observé au Maroc.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 240–241. With 1 plate.

ii. CANNATA (S.). **Leishmaniasi interna. Relazione al VI Congresso Medico Siciliano.**—*Riv. San. Siciliana.* 1921. No. 9. [Summarized in *Ann. di Med. Nav. e Colon.* 1921. Sept.–Oct. Year 27. Vol. 2. Nos. 3–4. pp. 651–652.]

DI CRISTINA (G.). **Terapia della leishmaniasi interna. Relazione al VI Congresso Medico Siciliano.**—*Ibid.* [Summarized *l.c.* p. 652.]

iii. SMITH (D. King). **Oriental Sore. Report of Four Cases.**—*Arch. Dermat. & Syph.* 1922. Jan. Vol. 5. No. 1. pp. 69–72. With 2 text figs.

i. A case of infantile kala azar in a child six years of age occurring in Tangiers. This is the second case to be recorded from Morocco.

ii. These two notes contain brief summaries of the addresses given by the authors at the Sixth Congress of Medicine held in Sicily in 1921.

iii. A description of four typical cases of oriental sore.

C. M. W.

RELAPSING FEVER.

BATES (Lewis B.), DUNN (Lawrence H.) & ST. JOHN (Joe. H.). **Relapsing Fever in Panama. The Human Tick,** *Ornithodoros talaje,* **demonstrated to be the Transmitting Agent of Relapsing Fever in Panama by Human Experimentation.**—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 183–210. With 4 charts in text.

This paper contains an account of experiments conducted with *Ornithodorus talaje* and relapsing fever, which prove conclusively that this tick is the transmitting agent of the disease in Panama. Six cases of relapsing fever were admitted to the Ancon Hospital during the last week of March and the first week of April, 1921. They came from two parties of boys who had gone hunting to Arraiján on March 15 and March 21. As the boys gave accounts of being badly bitten during the night an investigation of the locality was made, with the result that numerous *Ornithodorus talaje* were discovered in the huts they had occupied. These were collected for experiments, which have resulted in the incrimination of the tick as the vector.

Two white rats were infected by inoculating them with suspension of macerated naturally-infected ticks. Spirochaetes indistinguishable from the human blood forms were demonstrated in the coelomic fluid of the ticks. A monkey, *Macacus rhesus,* was infected by feeding a number of nymphs which had fed as larvae on an infected rat 22 days before. It was shown that the blood of an infected rat produced infection on injection in a human being. Another man was infected by hypodermic injection of a suspension of a naturally-infected crushed tick, while a third contracted the disease after being bitten by naturally-infected ticks.

Rats, mice and guinea-pigs were infected by inoculation of infected blood. In rats the spirochaetes usually appear in the blood in 24 to 48 hours. They increase in numbers during the second and third days and then become scanty and remain so up to the thirteenth day, when they disappear. Occasionally there is a return of spirochaetes to the blood stream. In mice the course of the infection resembles that in rats, while in the monkey the reaction is comparable to that of man. One monkey had two relapses, and another one. Some details of the appearance and structure of the spirochaetes in the blood and culture in Noguchi's medium are given. Multiplication by transverse fission was definitely observed, while the movement of granules on the spirochaetes was noted. A granule in the medium would sometimes come in contact with the organism and after moving to and fro along the body leave it again.

C. M. Wenyon.

NOC (F.) & NOGUE. **Ictères épidémiques et spirochètes au Sénégal.** —*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 460–470.

During 1916, 1919 and 1920–21, the authors had experience of epidemics of febrile jaundice which broke out amongst troops undergoing instruction in Senegal. The disease was ushered in by fever, headache and marked jaundice. The spleen and liver were enlarged and the urine contained large quantities of albumoses, and increased amounts of urobilin. There was sometimes epistaxis and arthritic pains. The temperature fell to normal and the jaundice disappeared. A few days later there was another attack, with return of the jaundice. As many as four such relapses were noted. In fatal cases a typhoid condition was present associated with delirium, bilious and black vomit, and scanty but highly albuminous urine. Post-mortem examination revealed general icterus, degeneration of the liver, presence of black blood in the stomach and intestine, and great congestion of the kidneys.

Discussing the diagnosis, yellow fever is ruled out, as in the fatal cases jaundice had disappeared before the end, while the natives were more severely affected than Europeans. It is evident that before a diagnosis of yellow fever can be made in the case of a native of Africa it is essential to exclude relapsing fever and icterohaemorrhagic fever. The symptoms shown by the majority of cases were those well known in relapsing fever. NETTER has noted jaundice in at least 25 per cent. of cases of relapsing fever, while NICOLLE, BLAIZOT and CONSEIL observed it in 53 of 160 cases. In 16 of the latter series it was marked. Furthermore, albuminuria occurred in 31 cases.

The authors discovered spirochaetes of the recurrent type in the blood of some of their cases, while spirochaetes were also present in the urine as in relapsing fever. Young guinea-pigs were infected through scarified areas of the skin. As regards icterohaemorrhagic fever it is known that the virus is present in rats in Senegal, and one case showed spirochaetes and leptospira in the urine. The latter, however, did not produce infection in guinea-pigs. It is concluded that the disease was really relapsing fever, though it is admitted that the possibility of a concurrent infection with *Leptospira icterohaemorrhagiae* cannot be absolutely excluded. A. LÉGER has noted that the wild rat of Senegal may harbour a spirochaete which resembles that of relapsing fever, both morphologically and in its pathogenicity to monkeys. An incomplete search did not reveal *Ornithodorus moubata.* On the other hand all the patients were lousy when admitted to hospital. In some of the lice spirochaetes like those occurring in the blood were discovered.

It is evident that if this disease is in reality relapsing fever it has a direct bearing on the question of the occurrence of yellow fever in Africa and has to be considered in all cases in which a diagnosis of this disease is made.

C. M. W.

SERGENT (Edm.) & FOLEY (H.). **Fièvre récurrente et ictère.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 632–633.

The paper by NOC and NOGUE reviewed above has led the authors of this note to record their experiences of an epidemic of relapsing fever observed in Algeria during 1907–14. Amongst the natives relapsing fever is of the classical type and no jaundice was noted. The virus was studied in the monkey, with blood from which two Europeans became accidentally infected by way of the conjunctiva. In both cases there was an incubation period of eight days. One case was of the ordinary type, the other was more severe. In the latter, with the advent of fever at the first attack there was marked jaundice but no spirochaetes could be found in the blood. The jaundice became more marked, and in spite of blood examinations made every two hours spirochaetes were only discovered on the third day. An injection of 0·6 gm. of arsenobenzol cut short the disease. The virus, which in the native does not produce jaundice, may in the European give rise to a condition which in the absence of spirochaetes causes uncertainty in diagnosis.

C. M. W.

BÜTTNER (Georg). **Drei Fälle von Febris recurrens, ein Beitrag zur Differentialdiagnose des Rückfallfiebers.** [Three Cases of Relapsing Fever: Contribution to its Differential Diagnosis.]—*Berlin. Klin. Woch.* 1921. Oct. 31. Vol. 58. No. 44. pp. 1296–1299.

The paper gives in detail the clinical history of three cases of relapsing fever which occurred sporadically in Germany. The author points out the difficulty of making a diagnosis in such cases, which occur quite apart from any epidemic, and discusses at some length the various diseases with which relapsing fever can be confused when the physician is off his guard and does not pay particular attention to the temperature chart, or neglects to make the necessary blood examination.

C. M. W.

ROAF (H. E.). **The Wassermann Reaction in Relapsing Fever.**—*Brit. Jl. Experim. Path.* 1922. Feb. Vol. 3. No. 1. pp. 59–60.

Eighteen cases of relapsing fever were examined from the point of view of the Wassermann reaction. Eleven gave a positive reaction at some stage of the disease, but six of the seven negative cases were only examined once. Of the cases tested repeatedly the positive reaction persisted in three out of nine for 17 to 21 days, while all the others had become negative 8 to 13 days after the onset of fever. It is evident that a transient positive Wassermann reaction may be expected as a constant phenomenon during the acute stages of relapsing fever.

C. M. W.

WEICHBRODT (R.). **Studien bei der Recurrensinfektion zwecks Beeinflussung von Psychosen.** [Studies on the Effects of Relapsing Fever Infections on Psychoses.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil. Orig. 1921. Vol. 33. No. 3. pp. 267–282. With 3 charts in text.

The investigations recorded in this paper were undertaken with the object of testing the effect of an infection with relapsing fever spirochaetes in various pyschoses. Injection was made with the blood of mice infected with different strains of spirochaetes. The conclusions reached were as follows :—

1. By inoculating mice it was found that spirochaetes were constantly present in the blood of men unless the intervals between the relapses were unduly prolonged.

2. The Georg Speyer-Haus strain, which is not pathogenic to human beings, could be demonstrated in the blood up to the second day after inoculation.

3. Reinfection was not possible even after the expiry of 18 months since a previous infection.

4. In the cerebro-spinal fluid spirochaetes were present two or three days after the first attack. Their occurrence does not appear to depend upon the relapses as it does in the blood. Thus, if mice are inoculated with blood shortly after a relapse infection may not reveal itself for nine days, whereas in mice inoculated with cerebro-spinal fluid taken at the same time infection may occur in two or three days.

5. Serum and cerebro-spinal fluid of recovered cases may hinder or entirely prevent an infection in mice, the former to a higher degree than the latter.

6. Hyperleucocytosis did not occur in all the cases inoculated, but in some of them the spirochaetal infection produced a marked improvement in the nervous condition.

C. M. W.

KLIGLER (I. J.) & ROBERTSON (O. H.). **The Cultivation and Biological Characteristics of** *Spirochaeta obermeieri* (*recurrentis*).—*Jl. Experim. Med.* 1922. Mar. 1. Vol. 35. No. 3. pp. 303–316.

The authors have experimented with various media with the object of obtaining information as to the factors which govern the growth of *Spirochaeta obermeieri*. They have found that success depends largely on the reaction (pH) of the medium, and they have arrived at the following method of its preparation :—

The basic medium consists of horse serum or rabbit serum diluted with one to two parts of saline solution or ascitic fluid undiluted. To this basis is added 1·0 per cent. peptone broth. This is done by adding 1·0 cc. of a 10 per cent. broth to each 10 cc. of fluid. The reaction is adjusted to pH 7·2 and the medium is distributed in 3–4 cc. amounts in tubes about 1 cm. in diameter. Each tube is then inoculated with one drop of infected blood, or, if subcultures are being made, with 0·1 cc. of culture, after which the medium is covered with a layer of oil 1·5 cm. in height. In the case of subcultures it is well to add one drop of fresh rabbit's blood just before covering with oil. The tubes are incubated at a temperature of 28°–30° C.

It was found that the diluted sera or ascitic fluid alone became progressively more alkaline on exposure to air, but that a balanced reaction could be secured by the addition of the peptone broth, which acted as a buffer, and by covering with oil. The reaction limits of growth and survival are between pH 6·8 and 8·2, with the optimum at pH 7·2 to 7·4. *Spirochaeta obermeieri* is a strict aerobe, so that to permit it to have adequate aeration the layer of oil must not be more than 1·5 cm. in height.

C. M. W.

STEVENSON (A. C.). **The Incidence of a Leptospira in the Kidneys and of Parasites in the Intestines of One Hundred Wild Rats examined in England.**—*Amer. Jl. Trop. Med.* 1922. Jan. Vol. 2. No. 1. pp. 77–81. With 1 plate.

An investigation of the incidence of natural infection with *Leptospira icterohaemorrhagiae* amongst wild rats in England is recorded in this paper. COLES, in Bournemouth, had found 9 infected out of 100 examined, while FULLERTON, examining 101 in the London area during the period July to November, found 4 infected in the latter month. He concluded that there was a seasonal incidence during the winter months.

The author of the paper under review examined two batches of 50 rats, mostly from the London area. The first batch was examined between February 2 and March 15, and the second between May 2 and June 22. Of the first batch 12, and of the second 18, were found infected. This gives an incidence of 30 per cent. All the positive rats were caught in London, except one, which was taken in Hampshire. Apart from the two series, guinea-pigs were infected from two rats which came from Cheshire and Kent. It was found that examination of smears of the kidneys stained by Giemsa or sections of these organs stained by Levaditi's method gave more reliable results than the inoculation of guinea-pigs, which only became infected with certain strains.

The urine taken from the bladder was examined by dark ground in 52 cases. The organism was found in 9 of these. Of these 52 rats 18 were proved to have a kidney infection.

It appears that there may be a high incidence of infection amongst rats in areas in which the human disease is practically unknown, and that there does not seem to be any definite seasonal incidence of infection.

C. M. W.

ITURBE (Juan) & GONZÁLEZ (Eudoro). **Observaciones referentes a la presencia de la** *Spirochaeta icterohemorragiae* **en la rata doméstica de Caracas. Datos acerca del diagnóstico bacteriológico y epide miologíade la enfermedad de Weil. Pseudo**—*Sp. icterohemorragiae.—Contribución del Laboratorio Iturbe en el 3er Congreso Venezolano de Medicina.* 1921. pp. 11–20. With 1 plate.

In a previous publication ITURBE and GONZÁLEZ (1918) recorded the presence of *Leptospira icterohaemorrhagiae* in the rats of Caracas [*see* this *Bulletin*, Vol. 13, p. 277]. The present paper describes the methods which were adopted to establish the identity of the organism in question.

C. M. W.

KANEKO (Renjiro). **Zur Kultur der** *Spirochaeta icterohaemorrhagiae* **und der** *Spirochaeta hebdomadis.—Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 345–354.

The investigations recorded in this paper were undertaken with the object of discovering the best medium for the growth of *Leptospira icterohaemorrhagiae* and *L. hebdomadis.* The following summary of the results is given :—

1. Human ascitic fluid gives a good growth if a little blood is added.
2. Various sera of animals, especially that of rabbits, may be used with success.
3. Rabbit serum gives the best result when diluted with 2–5 parts of Ringer's solution.
4. In the successful culture the presence of the colouring material of the blood is necessary.
5. The addition of agar to the medium favours growth.
6. The addition of a layer of paraffin on the liquid or semi-solid media is advisable, though not absolutely essential.
7. A slight alkalinity is the most favourable reaction for the medium.
8. The most rapid growth takes place at the blood temperature. When growth has taken place cultures can be kept at the ordinary laboratory temperature.

9. In culture the organisms gradually change as regards their capacity for multiplication.

10. As a result of his investigations the author recommends the following media :—

(*a*) Liquid medium. A drop of rabbit's blood is added to 2–3 cc. of a dilute rabbit serum (1 in 2–5 of Ringer's solution). The mixture is kept for 30 minutes at a temperature of 56°–58° C., after which a layer of sterile paraffin is superposed.

(*b*) Semi-solid medium. The above fluid is rendered semi-solid by the addition of 0·3 per cent. of ordinary agar. Three grams of agar are dissolved in 100 cc. of Ringer's solution and to each cc. of this is added 9 cc. of the dilute serum. A layer of sterile paraffin is added after heating as in (*a*).

C. M. W.

YAKIMOFF (W. L.). **Sur la question des spirochètes de l'intestin de l'homme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 532–535. With 1 text fig.

The organism described in this paper is one which, along with various protozoa, appeared in culture medium inoculated with the faeces of a patient in Petrograd. From the fact that the spirochaete was not seen in stained smears of the faeces and that the protozoa which appeared in the cultures were undoubtedly free-living organisms, though the author assumes them to be intestinal parasites, it may safely be concluded that there is no evidence that the spirochaete is an intestinal organism at all. Like the protozoa, it is very probable that the organism gained entrance to the faeces as an external contamination.

The author names the spirochaete *S. zlatogorovi* and groups it with the intestinal spirochaetes. It cannot, however, be too forcibly emphasized that the describing as intestinal parasites any organisms which turn up in media inoculated with faeces which have been exposed to external contamination is to be deprecated. The author of this paper, in conjunction with various co-workers, has recently described as intestinal parasites of man and animals a large number of protozoa and other organisms which have been obtained in this way. Quite apart from external contamination, cysts of free-living organisms are constantly passing through the intestine and will give rise to cultures in stale faeces. Neglect of this fact only leads to needless confusion in the literature.

C. M. W.

SCHNEEMANN (Erich). **Vergleichende Untersuchungen über neuere Spirochätenfärbungen.**—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Mar. 15. Vol. 86. No. 1. pp. 84–89.

An investigation of the various modifications of the Fontana stain for spirochaetes has led the author to the conclusion that dark field observations give much more reliable results as to the presence or absence of spirochaetes than do stained films. He has found that of staining methods that advocated by BECKER gives the best results. It is carried out as follows :—

1. Make thin serum preparations.
2. Drop on Huge's solution :—

Acetic acid	1·0 cm.
Formalin	20·0 cm.
Water	100·0 cm.

The liquid should be renewed once or twice during one minute and the film then washed.

3. Mordant (10 per cent. tannic acid + 1 per cent. carbolic acid), and warm over the flame till steam rises for half a minute. Wash.

4. Stain warm for half to three-quarters of a minute with Ziehl's carbolfuchsin :—

5 per cent. carbolic acid	100·0 cc.
Saturated alcoholic fuchsin solution..	10·0 cc.

The film is then washed in water, dried and examined.

C. M. W.

i. Rodino (Nicola). **Una epidemia di febbre ricorrente ad Itala nella Somalia italiana.**—*Giorn. di Med. Milit.* 1922. Feb. 1. Vol. 70. No. 2. pp. 90–93.

ii. Yakimoff (W. L.). **Sur la question du** *Spirochaeta bronchialis* **Castel. en Russie.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 633–634.

iii. Yakimoff (W. L.) & Solowzoff (A. S.). **Traitement de la fièvre récurrente par le "Luargol" de Danysz.**—*Ibid.* p. 633.

i. The description of a small outbreak of relapsing fever seen by the author in Italian Somaliland. There appear to be no features of special interest.

ii. During the examination of 157 specimens of sputum sent to the laboratory for diagnosis of tuberculosis, spirochaetes were found 29 times. As these correspond in size with those seen by various observers in the condition caused by *Spirochaeta bronchialis*, it is assumed that this disease exists in Russia.

iii. Luargol of Danysz in a single dose of 0·2 gram for a man of ordinary weight will bring about a cure of relapsing fever in 100 per cent. of cases. Smaller doses may be followed by relapse.

C. M. W.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

COLVILLE (H. C.). **Four Cases of Amoebic Dysentery.**—*Med. Jl. Australia.* 1922. Jan. 28. 9th Year. Vol. 1. No. 4. pp. 96–97.

This paper is a brief report of four additional cases of amoebic dysentery apparently contracted in Australia (see paper by DEW, page 329). The first patient, who was seen in August, 1920, was in first-class physical condition, and had suffered from diarrhoea for two and a half years. The remaining three patients were his mother, sister and brother, all of whom improved on emetine, though relapses have been frequent.

P. H. Manson-Bahr.

CONNOR (Roland C.). **The Combined Bismuth-Emetine Treatment for Amebic Dysentery and Amebiasis.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 19–27.

The following course of treatment has been adopted by Connor in the Ancon Hospital from May, 1914, up to August, 1918. A preliminary dose of 2 oz. of castor oil is followed four to six times a day, according to the severity of the symptoms, by a " heaping teaspoonful " of bismuth subnitrate well mixed with 4 to 6 oz. of water. If the bowels are opened frequently (10 to 20 times a day) bismuth is given every three hours, and then every four hours, till the patient has no stool for 24–48 hours ; and then a dose of castor oil, and afterwards the bismuth three times a day. A normal saline irrigation is ordered twice daily when there is evidence of an extensive colitis. Emetine is given in four treatments three to five days apart in severe cases, and in three treatments four to five days apart in mild infections. Rarely is less than 1 gr. given daily to an adult, unless the debility is very great. Often emetine is ordered in doses of 1 gr. twice a day eight hours apart on two or three successive days, or 1 gr. a day in three successive days, followed by an interval of three days. The smallest quantity of emetine given an individual was 3 gr., the largest 17½ gr. ; the average per patient is about 8 to 10 gr. More than 100 amoebic dysentery cases have been thus treated since 1914, and, as far as can be ascertained, only one has relapsed.

P. H. M.-B.

LICHTENSTEIN (A.). **Therapeutische moeilijkheden bij de amoebiasis van het darmkanaal.** [Therapeutic Difficulties in Amoebiasis of the Intestinal Tract.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 540–550.

The author considers diarrhoea to be a possible symptom of emetine poisoning, and quotes two cases to prove this. Worm infection, in his opinion, badly interferes with the healing tendency of amoebic dysentery, and chenopodium oil treatment very often has a beneficial influence. In cases where the stools remain liquid without apparent reason the author saw good results after injections of neosalvarsan. Internal treatment with this drug in capsules gave no better results. The author is in doubt whether neosalvarsan acts as well in non-syphilitic cases as in syphilitics. In his cases it was difficult to exclude syphilis.

W. J. Bais.

FURUICHI (T.). **[On the Perityphlitis caused by the Dysentery Amoeba.]** —*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. of Formosa*). 1921. Nov. 30. No. 219. p. 2. [English Summary.]

Of the 85 patients with amoebic dysentery in the Taichu Hospital during the last five years, the author found in three cases perityphlitis as a sequel. All were cured by emetine. P. H. M-B.

ROGERS (Leonard). **Lettsomian Lectures on Amoebic Liver Abscess: Its Pathology, Prevention, and Cure.** *Lancet.* 1922. Mar. 11 & 25 & Apr. 8. pp. 463-469. With 1 chart; pp. 569–575; 677–684. With 1 chart. Abstract in *Brit. Med. Jl.* 1922. Feb. 11, 18, & Mar. 4. pp. 224–225; 264–266; 345–347.

In the Lettsomian lectures Rogers has summarized in a succinct form his well-known views upon the etiology, diagnosis and treatment of amoebic liver abscess. He associated the constant presence of amoebae with liver abscess in 1902 on examining the pus removed at operation. In 18 cases he found amoebae in the pus in four only, but in scrapings of the abscess wall they were present in every case but one. In 20 autopsies he found the organisms in the bowel wall in 19. Generally the pus proved to be sterile; out of 24 cultures, no growth was obtained in 15, or 62 per cent.; at autopsy 86 per cent. were sterile; thus *Entamoeba histolytica* was indicted as the causative organism. That hepatic abscess followed antecedent dysentery he was able to prove in 45 necropsies; evidence of active amoebic dysentery was found in 78 per cent. and scars of dysenteric lesions in 20 per cent. The dysenteric lesions in cases of large liver abscess were limited to the caecum in 13 out of 36 cases, and were restricted to small areas of the large gut in 23; the dysenteric process was latent in all. Taking all facts into consideration, Rogers considers that in slight or latent amoebic colitis, from which large abscesses usually result, comparatively few amoebae reach the liver, the vast majority undergoing degeneration in the vessels; this condition produces amoebic hepatitis. But when the amoebae reach some part of the liver in such numbers as to cause clotting of several small veins, and thus to produce necrosis, permitting the escape of amoebae into the soft tissues, an abscess results.

In about 70 per cent. of cases the abscess is single. Among 38 cases of more than one abscess, two were found in 44·7 per cent., three in 26·3 per cent., four in 18·4 per cent., and over four in 10·6 per cent.

After the opening of a large liver abscess a secondary bacterial infection appeared to be inevitable.

The reason why aspiration of liver abscess was not appreciated until it was again advocated by Rogers apparently was because it had not been combined with specific medicinal treatment. Rogers gave up quinine as an irrigant after discovering the greater value of emetine.

While maintaining that the method of repeated aspiration combined with specific medication is the method of election, Rogers allows that open operation is still necessary in certain circumstances. The records of the British Army in India collected over 14 years show 2,661 cases treated by the open operation, with a mortality of 56·7 per cent.; 111 cases, collected from various sources, treated by aspiration show a mortality one-fourth of the former figure.

In the course of time Rogers became convinced that ipecacuanha was a valuable drug in the prevention of hepatic suppuration.

The author ascribes the cirrhosis of the liver so frequently encountered in India to long-continued amoebic irritation of the portal branches in amoebic dysentery.

Since the introduction of the ipecacuanha treatment and its late improvements (emetine), the incidence of amoebic disease has diminished. The admissions for liver abscess to the European General Hospital, Calcutta, have fallen by half during the years 1915–21 as compared with figures obtained previous to that period.

P. H. M-B.

LANGLEY (George J.). **The Difficulties in Diagnosis and Treatment of Hepatic Abscess.**—*Brit. Med. Jl.* 1921. Dec. 24. pp. 1073–1074. With 1 chart in text.

The present relatively high frequency of hepatic abscess is the result of oversea service during the recent war. The fact that a patient has had a liver abscess in the past, even when surgically treated, by no means excludes the development of a second abscess at some much later date. Two cases illustrative of this point are cited, in one of which an abscess recurred after seven years. Cases presenting the syndrome of dysentery, pyrexia, leucocytosis, hepatic pain and enlargement, even when the right dome of the diaphragm is pushed up and fixed, may still be examples of acute amoebic hepatitis. It is this condition which is specially amenable to emetine therapy, so much so that radiographic examination at four-day intervals enables one to follow the diminution in the size of the liver.

A history of definite dysentery is not always obtainable. Two forms of bowel looseness are associated with this grave condition: (1) Diarrhoea occurring at night, the bowel acting three or four times; and (2) two or three loose evacuations in the morning between breakfast and midday. Grave difficulty may arise from the scarring which must follow the evacuation of a liver abscess. The scar tissue in the upper abdomen may become herniated and necessitate another operation to repair the breach. Liver abscess may rupture into the lesser peritoneal sac; such instances are rare, but one is recorded where an emergency operation revealed a fluctuating swelling the size of a coconut, which was successfully drained through the lesser omentum. Not every solitary abscess is due to the entamoeba; it may be simulated very closely by a suppurating hydatid cyst, of which two illustrative cases are cited, one of which occurred in a machinist who had never been out of England.

P. H. M-B.

DEW (Harold R.). **Amoebic Abscess of the Liver.**—*Med. Jl. Australia.* 1921. Dec. 3. 8th Year. Vol. 2. No. 23. pp. 510–511. With 2 text figs.

Few cases of liver abscess indigenous to Australia have hitherto been recorded.

Two fatal cases are here described, one suspected to be pneumonia, the second provisionally diagnosed as cholelithiasis; in both the primary abscess had burst into a bronchus, and in both death occurred a few days subsequent to operation.

The failure to diagnose liver abscess earlier and the lack of microscopical faeces examination are commented upon.

P. H. M-B.

HIRTZMANN (L.). **Histopathologie de l'amibiase hépatique.**—*C.R. Soc. Biol.* 1922. Jan. 21. Vol. 86. No. 3. pp. 127–129.

Sections of a liver in the condition of subacute hepatitis, on the 14th day of an attack of amoebic dysentery, show small ecchymoses ranging from the size of a pea to that of a hazel nut. The cell protoplasm of the hepatic cells had undergone degeneration with karyolysis of the nuclei; no entamoebae were seen. In a liver containing necrotic foci the hepatic cells had lost all recognizable structure, but in the surrounding zone of reaction large mononuclear leucocytes, eosinophile cells and entamoebae could be recognized. A zone of congestion with necrosis of the hepatic cells is also described. The capillary vessels themselves are engorged with red blood corpuscles, and contain entamoebae. Besides this, a zone of irritation and cellular reaction can be recognized in which the cell nuclei are swollen and are undergoing karyolysis. There are other necrotic foci, which are due to the presence of entamoebae with a bacillary infection superadded. Here polymorphonuclear leucocytes predominate.

P. H. M-B.

HODSON (V. S.). **[On Emetine in Liver Abscess.] (Correspondence.)**—*Jl. Trop. Med. & Hyg.* 1922. Mar. 1. Vol. 25. No. 5. p. 64.

The author emphasizes his views on the treatment of liver abscess by emetine alone [see this *Bulletin*, Vol. 18, p. 38]. On the reasonable assumption that the amoebae in the liver are killed by the emetine, he can anticipate no more difficulty in the subsequent absorption of the inert abscess than in the absorption, say, of a gumma in the liver. His argument is that the abscess in its active condition is delimited by a defensive zone of hyperaemia. So long as the amoebae are alive, the "flow" from this zone is towards the abscess, but when the amoebae have been killed by the emetine the current as regards the now inert abscess becomes centrifugal, and results in the absorption and extinction of the abscess. He regards the rise of temperature that follows the administration of emetine as an indication of the death of the amoebae and of the turn of the tide that starts the absorption. A. A.

FERRIS. **La dysenterie et l'hépatite suppurée au Dahomey.**—*Ann de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 200–202.

From the nature of the cases and from the fact that liver abscess is frequently observed, Ferris is of the opinion that amoebiasis is common in Dahomey. During the early part of 1921, he diagnosed seven cases of hepatic abscess, two in Europeans and five in natives. One case was a native child of 18 months, in whom at operation a collection of pus was found on the anterior border of the liver the size of a large nut. Convalescence was rapid and uneventful.

P. H. M-B.

MCDONALD (F. R.). **Case Report. Liver Abscess following Amoebic Dysentery.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. p. 453.

A record of unexceptional interest. A Chinese woman suffered from hepatic enlargement subsequent to previous amoebic dysentery. Symptoms subsided under emetine, operation being refused. [No evidence is adduced as to the actual presence of pus in the liver in this case.]

P. H. M.-B.

RODENHUIS (Y.). **Over het bestaan van verschillende rassen van** *Entamoeba histolytica.* [On the Existence of Different Races of *E. histolytica.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 655–672. With 3 plates (35 curves).

DOBELL and JEPPS [this *Bulletin,* Vol. 12, p. 4] concluded from their experiments that there are at least five different races of *Entamoeba histolytica,* distinguishable from each other by the curves representing the dimensions of their cysts.

Rodenhuis thinks that different factors may bring on irregularity of obliquity of the curves :—

1. Faulty technic in measuring the cysts [the original should be seen for details].

2. The amoebae may encyst themselves in different stages of growth, so producing cysts of different measurements. Encystation in the earlier stages might cause a surplus of the smaller cysts in the curve.

3. The conditions of life of the amoebae may be influenced by the surroundings (diet of the host, variations in the intestinal flora and fauna). It is not known with certainty whether an amoebic strain changes its average dimensions if transmitted from a carrier to another person. Some observations of the author on a family of carriers suggest that such a change may occur.

Rodenhuis never found curves that convinced him of the simultaneous occurrence of different races in one patient. He points out that the combinations cited by DOBELL and JEPPS always concern a "small strain" besides an "ordinary strain," and gives arguments for the attribution of the "small strains" to a different species, *Entamoeba tenuis* (KUENEN and SWELLENGREBEL), which is without pathogenic action in young cats. He concludes that "the existence of different races within the species *Entamoeba histolytica* has not yet been proved."

W. J. Bais.

FISCHER (Walther). **Einiges ueber Zysten der** *Entamoeba coli.*—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 491–494.

Some observations on a chronic case of recurrent painful diarrhoea where "vegetative forms" and afterwards cysts of *Entamoeba coli* were found in the stools. The cysts ranged in size from 16 μ to 22·4 μ. The patient, a woman of 38 years, was successfully operated upon for removal of the appendix, and cysts were not to be found at two examinations of the stools after her recovery. The author leaves the question as to the pathogenic capability of *E. coli* undiscussed, but thinks that the clinical symptoms in this case suggest possibilities.

A. A.

BACILLARY DYSENTERY.

VIOLLE (H.). **Sur une épidémie de dysenterie dans le département de la Seine.**—*Bull. Acad. Méd.* 1921. Dec. 6. Vol. 86. 3rd Ser. No. 40. pp. 321–323.

In the autumn of 1921 numerous cases of dysentery were noted in the suburbs of Paris, especially in the districts of Maisons-Alfort and Alfortville, children and old people being most frequently attacked.

Shiga's bacillus was responsible; the particular strain isolated by Violle was particularly pathogenic for rabbits, whether injected in living or killed cultures. When given subcutaneously the remarkable feature was the manner in which the virus attacked the small intestine, contrary to the usual sequence in man, in whom the large gut is the seat of disease; this fact has hardly attracted the attention it deserves. The microbic flora in the rabbit also becomes completely altered; the dysentery bacillus predominating over all the others. The characteristic pathology of bacillary dysentery in this animal is probably to be ascribed to the anatomical features and fermentative reactions of the alimentary tract.

The original source of infection was believed to be a convalescent depot in the district. It is possible that the dysentery bacillus flourishes and lies dormant during the winter in decomposing manure, which the market gardeners of this region are in the habit of storing in silos. The surface water being contaminated by this means, the epidemic rapidly spreads, being favoured by the disparity between the water levels of the Marne and the Seine. The subsoil water also becomes contaminated by the emptying of privies on to the garden plots. The two districts mentioned are situated at the confluence of the two rivers and are therefore favourably situated for the development of dysentery epidemics.

P. H. M-B.

BERNSTEIN (S.), KLING (D.) & ROSENBLATT (S.). **Ueber die Ruhr in Wien (auf Grund der Epidemie im Sommer 1920).**—*Wien. Klin. Woch.* 1921. Nov. 3 & 10. Vol. 34. Nos. 44 & 45. pp. 531–534; 549–551.

The authors studied 901 cases, between the ages of one and 40 years, with a death-rate of 4 per cent.; and 538 cases, from 40 to 80 years, with a death-rate of 24 per cent. Women, on the whole, appear to have been slightly more liable to contract dysentery. The bacteriology of these epidemics has been reported upon by KIRSCHNER and SEGALL [this *Bulletin*, Vol. 17, p. 175], who isolated Shiga-Kruse bacilli 120 times, pseudo-dysentery 124, Schmitz 12, and *Bacillus faecalis alkaligenes* 6 times. Dysentery must be regarded as a symptom of want and privation, and its spread can only be counteracted by improvement in general nutrition and in hygienic conditions. The clinical features of the Austrian cases did not call for special comment. In the fatal cases intoxication was the main feature; oedema was noted, but could generally be attributed to heart or kidney disease.

Prior to the war, as in the case of the larger Central European cities, dysentery was practically unknown in Vienna. In 1914, 1,279 military cases were notified, but comparatively few cases occurred amongst the civil population—about 200 in 1916. In the summer of 1917 an extensive civil epidemic arose; 2,229 civil cases were notified in that year, 2,316 in 1918, and 3,355 in 1919. In the production of the epidemic several factors, such as numerous foci of infection added to intimate personal contact, are necessary. These conditions were supplied by the return of demobilized soldiers to their homes; in many cases they were either convalescent from dysentery, or were carriers of the infection. The protracted struggle with privation and the hardships it entailed had rendered the population susceptible to infection, and simultaneously dysentery epidemics were reported from various parts of Germany and Austria where hitherto the disease had been unknown.

Dysentery persisted throughout the winter of 1920, the number of cases averaging about 20 per month. In 14 weeks 1,439 clinical dysenteries were notified, with a death-rate of 12·4 per cent. In the suburb of Oberlan the epidemic could be clearly traced to one fatal [?] case, and owing to lack of adequate sanitation it spread quickly as a house-to-house infection, a mode of infection which could hardly be avoided in the small semi-detached workmen's dwellings. The death-rate in these circumscribed suburban epidemics was an exceptionally high one. In Laa, out of 101 cases, it was 10 per cent.; in Laintz, out of 70 cases, it was 41·4 per cent., the disproportion in the latter instance being possibly accounted for by the greater age and debility of the patients.

Hypochlorhydria with dyspeptic disturbances was observed in a high percentage of cases. Albuminuria was often observed, but a positive diazo-reaction hardly ever. Typhus often occurred as a complication. Coexisting tubercular disease rendered the prognosis grave. Bronchopneumonia was common in patients over 40. Arthritis, as a rule, ran a benign course, but one exceptional case was noted which lasted for 10 months, and in which X-rays demonstrated extensive joint changes and periosteal swellings.

The sigmoidoscope proved a valuable aid to diagnosis. In slight cases hyperaemia, increased mucoid secretion and haemorrhages were noted, and in the space of two weeks a dry but contused mucosa. In severe cases paresis of the sphincter and a mucosa covered with a diphtheritic membrane and a deep red raspberry-like surface; later still, submucous abscesses discharging pus, and granulations. In the chronic stages, changes in the mucosa to a state resembling ulcerative colitis could be traced.

In the treatment of acute cases these authors consider the effect of antidysenteric serum in doses of 40 to 80 cc. to be limited; the best effects are seen in moderately severe cases. Appendicostomy and partial caecostomy, with subsequent lavage of the large bowel, were not in their experience followed by any good results.

P. H. M-B.

ORNSTEIN (Max). **Zur Bakteriologie des Schmitzbazillus.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 152–178.

This paper embodies a careful and exhaustive research into the characters and morphology of Schmitz's bacillus. This organism, Ornstein considers, is a distinct and characteristic species. Non-motile and Gram-negative, it has many cultural features in common with the Shiga-Kruse bacillus, but differs in producing indol and a yellow fluorescence in neutral-red-lactose media. On Endo's medium, its colonies are characteristic, and are larger than those of Shiga's bacillus, the rounded colonies possessing an attenuated, but tessellated, margin. Schmitz's bacillus produces a well-marked and specific antigen. Whether the bacillus possesses the pathogenic properties originally claimed for it still remains to be proved.

The bacillus has to be differentiated from several closely similar species. *Bacillus fallax* can be differentiated by its power of producing acid from saccharose after prolonged incubation, and by its immunity reactions. Another somewhat similar bacillus—*B. inconstans*—may occasionally produce gas in dextrose. The colonies of the latter two bacilli are easily separable from those of Schmitz on saccharose-fuchsin-sulphite-agar. Schmitz's bacillus, on frequent subculture under varying conditions, remains true to type. Agglutination in acid media (MICHAELIS) does not usually take place; *B. fallax* and *inconstans*, however, are strongly clumped under these conditions. A specific serum agglutinating Schmitz's bacillus in high titre can be easily produced, living organisms being more easily clumped than dead cultures. Complement-deviation tests were confirmatory; using *fallax* and *inconstans* as antigens, no fixation of complement was obtained with Schmitz-immune sera.

Attempts to isolate a virus toxic to rabbits from Schmitz's bacillus failed.

P. H. M-B.

i. BLUMENTHAL (G.). **Zur Aetiologie der bazillären Ruhr.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 335–352.

ii. SCHMITZ (K. E. F.). **Bemerkungen zu der Arbeit von G. Blumenthal: "Zur Ätiologie der bazillären Ruhr." Diese Zeitschr. Bd. 91. S. 335.**—*Ibid.* 1921. Vol. 92. pp. 516–517.

i. Several strains of dysentery bacilli differing from the type organisms in their serological reactions were isolated. Heat-killed cultures were agglutinated solely by homologous sera.

The etiological importance of these serological types is uncertain; but the fact that they are agglutinated by the patient's sera would seem to be suggestive. Agglutination experiments indicated that SCHMITZ's bacillus corresponds to the type J of KRUSE.

The author contends that the Flexner-Y sera usually employed are useless for bacteriological diagnosis. For this purpose a multivalent serum containing agglutinins for Kruse types A, D, and H, as well as a univalent serum specific for type E, are, he considers, necessary.

ii. The fact that Shiga's bacillus is agglutinated by serums of Schmitz-dysentery cases, the author writes, need not necessarily invalidate the Schmitz-bacillus as the cause of the disease.

Schmitz maintains that he took every possible care to isolate Shiga's bacillus from his series of cases, but failed to do so. On the other hand, Schmitz's bacillus was present in practically a pure culture. Why, he argues, if it is not the cause of the dysentery, is Schmitz's bacillus agglutinated to such a high titre by the serums of the patients? He considers that dysentery caused by the Schmitz-bacillus is more widespread than was formerly believed.

P. H. M-B.

KNORR (Maximilian). **Experimentelle Studien ueber die Wirkung von Rindergalle auf Ruhrbazillen.** [Study on the Action of Ox Gall on Dysentery Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 339–345.

Bile exerts a certain deleterious effect upon Shiga-Kruse bacilli, more damaging to some strains than to others. These dysentery bacilli may circulate in the blood in the earlier stages of the illness, and, taking this into consideration, and especially the tendency of bile to kill off the bacilli in small numbers, it is not surprising that the chances of recovering dysentery organisms in bile media from the blood are small. On pseudo-dysentery bacilli the effect is the same, but upon the so-called Y strain it has no deleterious action. These experiments suggest the use of bile in Shiga-dysentery as a therapeutic agent.

P. H. M-B.

MITA (K.). **Dysentery-like Diseases (Paradysentery, Paratyphoid) in Children and their Causes.**—*Jl. Infect. Dis.* 1921. Dec. Vol. 29. No. 6. pp. 580–590. With 1 plate.

Various types of bacilli may be the cause of dysentery in children. While the classical types of dysentery bacilli can be isolated, not infrequently other kinds of dysentery bacilli are present as well. Mita is of the opinion that at least one quarter of the cases are traceable to organisms not of the true dysentery type. Paradysentery bacilli are small, non-motile rods. After prolonged incubation, milk is coagulated by them; round and irregular colonies are produced; in some instances the organisms show marked bipolarity when stained by Ziehl's stain. Dysenteric symptoms may also be produced by a paratyphoid organism forming acid and gas in mannite and dextrose, but not affecting saccharose, maltose, dextrose and lactose. This organism he proposes to call "Paratyphoid X."

P. H. M-B.

MINODA (Mitsugu). **[On the Etiology and Pathology of Infantile Dysentery-like Diseases.]**—*Fukuoka Ikadaigaku Zasshi* (*Arch. of the Fukuoka Med. College*). 1921. Apr. Vol. 14. No. 1. [Summarised in *Japan Med. World.* Tokyo. Aug. 15. Vol. 1. No. 4. p. 22.]

The dysentery bacillus was isolated from 334 cases, but from 70 others bacteria other than of dysentery were obtained. Of common occurrence were two bacilli, named paradysentery bacilli A and B. The behaviour of the bacillus towards the serum of the patient, and its morphology and cultural reactions, were studied. The specific pathological feature was a diphtheroid inflammation, but never so intense as that caused by the true dysentery bacillus. From the results of the author's observations over four years, from 1916 to 1919, he finds that the ratio of infection with paradysentery bacilli to that caused by true dysentery bacilli is 1 : 3.

P. H. M–B.

TAWARA (Shugo). **[Researches on the Strain of Dysentery Bacillus isolated from Infantile Dysentery, including "Ekiri."]**—*Jika Zasshi* (*Jl. Jap. Soc. of Pediatrics*). 1921. Feb. No. 249. [Summarized in *Japan Med. World.* Tokyo. 1921. June 20. Vol. 1. No. 2. p. 18.]

A study based on "ekiri," or suspected cases of dysentery, during the last 7 years.

The total number of cases was 450, of which 196, or 47·5 per cent., belong to the so-called third type of dysentery bacillus, 187, or 41·5 per cent., to the first type, 25, or 5·5 per cent., to *Bacillus pseudodysenteriae.* Only 5 cases, or 1·1 per cent., were caused by the Shiga dysentery bacillus. Investigations are being directed to the point whether certain types, as well as pseudodysentery bacilli, are independent species or only metamorphosed forms. In certain cases in children of 2–6 years the bacillary toxins affect the brain; prognosis then is bad. Almost all the cases of so-called "ekiri" are examples of infantile dysentery.

P. H. M-B.

TSUCHIHASHI (Kotaro). **[A Study on the Leucocytes in Infantile Dysentery and Para-Dysentery.]**—*Jika Zasshi* (*Jl. Jap. Soc. of Pediatrics*). 1921. June. No. 253. [Summarized in *Japan Med. World.* Tokyo. 1921. Oct. 15. Vol. 1. No. 6. pp. 17–18.]

A detailed blood examination was made in 41 cases of infantile dysentery and para-dysentery. No difference in the features of the leucocytes was discernible; in both a leucopenia is present; the polymorphs are increased at the height of the disease, but decrease during convalescence; the lymphocytes are proportionately increased and vary inversely as the polymorphs. The eosinophiles decrease in numbers in the initial stages and in severe and fatal cases eventually disappear.

P. H. M-B.

V. FRIEDRICH (Ladislaus). **Zur Frage der Pankreasfunktion bei der Ruhr.**—*Muench. Med. Woch.* 1922. Mar. 10. Vol. 69. No. 10. pp. 344–347.

The duodenal secretions in 20 cases were removed by means of a duodenal sound and examined for trypsin and diastase. In the acute stage of bacillary dysentery there appears to be an achylia and a definite alteration in the character of the pancreatic secretion. In the chronic stages the achylia persists and the pancreatic secretions are diminished, but not altered in chemical composition. The author believes that the incompleteness of digestion, as evidenced by the abundance of food remains in dysenteric dejecta, is to be ascribed to interference with the digestive and absorptive functions of the small intestine.

P. H. M-B.

LEAGUE OF NATIONS. **International Conference on the Standardisation of Sera and Serological Tests, convened by the Health Committee of the League of Nations and held on December 12th to 14th, 1921, at the British Ministry of Health, London.—Société des Nations. Conférence Internationale de la Standardisation des Sérums et des réactions sérologiques convoquée par le Comité d'Hygiène de la Société des Nations et tenue du 12 au 14 décembre, 1921, au Ministère de l'Hygiène, Londres.**—18 pp. 1921. Dec. 30. Genève.

The resolutions adopted by the Sub-Committee on Dysentery Serum were to the following effect:—

It was agreed to be advisable for different institutes, laboratories, etc., to exchange samples of serum and toxin, and that further experiments should be carried out, using different methods of titration and different species of animals.

In testing the potency of sera there was a general agreement that the anti-toxin, especially the anti-endotoxin, should be estimated; it could be carried out equally well with dead bacilli as with toxin. It was recommended that a series of tests should be carried out on mice, rabbits and guinea-pigs with the standard serum which the Frankfort Institute would supply, comparing them with the methods in use in the various institutes; it is advisable to test the anti-microbic power of a serum by employing living bacilli for the purpose. It is not necessary to inoculate horses with several strains of B. Shiga-Kruse in order to produce experimental anti-sera. It was agreed that the question of preparation and the standardization of polyvalent sera prepared from various other atoxic dysentery bacilli should not be discussed, in view of the actual state of knowledge on this subject.

P. H. M-B.

JOSEPHS (Hugh W.) & DAVISON (Wilburt C.). **The Sero-Therapy of Bacillary Dysentery in Children.**—*Jl. Amer. Med. Assoc.* 1921. Dec. 10. Vol. 77. No. 24. pp. 1863–1864.

Encouraged by enthusiastic reports in favour of specific serum therapy in both Flexner and Shiga dysentery during the last two years, the authors administered antidysenteric serum to 20 children, aged from 6 months to 4½ years, who were suffering from dysentery—polyvalent serum, in doses from 20–50 cc., being injected intravenously or subcutaneously. In some instances as many as six doses, at intervals of from 24 to 48 hours, were given. In two cases of Shiga infection Rockefeller Institute Shiga dysentery antitoxin, in doses of 20 cc., was employed. During 1919 and 1920, 73 cases in children were studied, in all of which the clinical diagnosis was confirmed by the recovery of dysentery bacillus from the stools or post-mortem.

Subcutaneous or intramuscular injection of this serum is harmless; no symptoms of anaphylaxis were noted. Subsequent reactions were slight; serum sickness, a rise of temperature or urticaria bore no relation to the ultimate outcome. A table shows the results of cases treated and untreated by serum, divided, as accurately as possible, into severe, moderate and mild groups. The mortality in the untreated and treated severe cases was practically identical (78 and 77 per cent. respectively). On the whole the mortality amongst the treated cases was greater (50 per cent.) than amongst the 53 untreated cases (28 per cent.). The authors do not believe that serum actually increased the mortality, but it is probable that the treated group contained more severe infections. Further statistical tables indicate that serum administered during the first few days of the disease is more beneficial than when injected during the second week. It is clear that serum has no effect in prolonging life in severe cases, nor has it any effect upon the number and character of the stools. In the very ill, especially in infants, the pain at the site of injection is a contra-indication to the use of intramuscular injections.

P. H. M-B.

JEZIERSKI (W.) & WIERZBICKI (B.). **[Traitement de la dysenterie par les antigènes.]**—*Nouvelles Méd.* Poznan. 1921. 1st Part. Vol. 33. Nos. 1–5. [Summarized in *Bull. Inst. Pasteur.* 1922. Feb. 15. Vol. 20. No. 3. p. 118.]

Dysenteric antigens (vaccines) were employed in 27 cases of bacillary dysentery, in almost every instance with success. There was only one fatality, in an old woman of 70. The antigens were given by a novel method, in enemata. An ampoule of the vaccine was diluted with 150–200 cc. of water and introduced drop by drop into the intestine by means of a rubber tube 25–30 cm. in length. The treatment lasted 2–8 hours in each instance and was spread over a period of eight days.

P. H. M-B.

BESSON & DE LAVERGNE. **De la différenciation des bacilles de Flexner et de Hiss récemment isolés de l'organisme, par le sérum de cheval agglutinant le bacille de Shiga.**—C.R. Soc. *Biol.* 1922. Feb. 11. Vol. 86. No. 6. pp. 323–324.

It is generally admitted that the bacilli of Flexner and of Hiss can be distinguished by one characteristic only, the fermentation of maltose. The ability of the Flexner bacillus to ferment this substance is lost by frequent subculture; on the other hand, certain strains of Hiss's bacillus actively acquire this property on subculture. The table of serum reactions set out by the authors shows that Hiss bacilli recently isolated from stools are not agglutinated in lower dilutions by anti-Shiga serums, whereas old subcultures of Flexner bacilli certainly are.

P. H. M-B.

DOLD (Hermann) & CHEN YÜHSIANG. **Ueber die Lebensdauer einiger pathogener Bakterien (Typhusbazillen, Paratyphusbazillen, Dysenteriebazillen, Choleravibrionen, Diphtheriebazillen) auf Papiergeld.** [The Life of Pathogenic Organisms on Paper Money.]—*Arch. f. Hyg.* 1920. Vol. 89. Nos. 1, 2 and 3. pp. 63–70.

Previous investigators have busied themselves with studying the possible spread of disease by means of pathogenic organisms upon metal coins. The result of these investigations has been that aerogenous micrococci and fungi were the species most commonly found. *Bacillus coli*, in spite of its wide distribution in nature, does not long remain viable on metal pieces. The question of the disease-carrying possibilities of paper money has so far received no attention. The organisms investigated in this enquiry were *B. typhosus*, *B. paratyphosus* B, dysentery, cholera, and diphtheria bacilli.

Fresh Chinese bank notes were used; they were first cut into pieces 1 cm. square, sterilized in damp heat and then dried; subsequently they were covered by a thin emulsion of the organism under investigation. The infected pieces were kept in large Petri dishes at room temperature screened from direct sunlight. From time to time such a piece was removed and tested for living organisms. The following results were obtained:—

VIABILITY ON PAPER MONEY.

	Minimum.	Maximum.
Typhoid bacilli (stock culture)	12 hrs.	36 hrs.
,, ,, in typhoid stool	72 ,,	120 ,,
Paratyphoid B (stock culture)	48 ,,	132 ,,
Dysentery, Shiga-Kruse bacillus (stock culture) ..	2 ,,	24 ,,
Cholera vibrio (stock culture)	10 mins.	1 ,,
Diphtheria bacillus (stock culture)	19 hrs.	24 ,,
,, ,, (fresh culture)	96 ,,	120 ,,

The conclusion reached is that the possibility of the conveyance of the main disease-producing germs through the handling of paper money cannot be disregarded. The fact that typhoid bacilli can be recovered and are viable for a much longer period in faeces than in artificial cultures would seem to indicate that in a natural organic substratum they are capable of being spread more widely by this means. Old notes constitute a much more favourable medium for growth and retention of these organisms than do those of recent issue.

P. H. M-B.

ZOLLER (H. F.) & CLARK (W. M.). **[The Production of Volatile Fatty Acids by Bacteria of the Dysentery Group.]**—*Jl. Gen. Physiol.* 1921. *Vol. 3. No. 3. pp. 325–330. With 1 fig. [Summarized* in *Experiment Station Record.* Washington. 1921. Sept. Vol. 45. No. 4. p. 311.]

A close agreement exists among all the organisms of the dysentery group studied, in the total quantity of volatile fatty acids produced, and in the ratio of formic to acetic acids under aerobic conditions and in the presence of 1 per cent. glucose. When grown upon peptone alone, with free access of air to the cultures, volatile fatty acids are produced in appreciable quantities, although the reaction of the solution has become more alkaline when tested by colorimetric pH tests. Upon exhaustion of air from the sugar-free medium the bacteria again produce formic and some butyric acids. The presence of glucose in the medium from which air has been pumped furnishes a condition which provokes the same type and degree of fermentation that operates in the glucose medium bathed in air at atmospheric pressure. The large quantity of formic acid produced by these bacteria may play a significant part in the digestive disturbances and toxic symptoms accompanying their infection of the human intestinal tract.

P. H. M-B.

KENDALL (Arthur Isaac) & HANER (Reba Cordelia). **The Nitrogenous Metabolism of** *B. dysenteriae* **(Shiga)**, *Bacillus typhosus, B. paratyphosus* **alpha and** *B. paratyphosus* **beta. Studies in Bacterial Metabolism. LVIII–LXI.**—*Jl. Infect. Dis.* 1922. Feb. Vol. 30. No. 2. pp. 225–238.

Shiga's bacillus differs from other members of the dysentery group in producing the same amount of ammonia in plain and glucose broths during the earlier days of incubation. Although one of the more inert bacteria, chemically speaking, the changes produced by it in the nitrogenous constituents of the media are perfectly clear. In gelatin media the Shiga bacillus finds the best pabulum in the residual non-protein portion.

P. H. M-B.

KENDALL (Arthur Isaac), HANER (Reba Cordelia) & BLY (Robert S.). **The Nitrogenous Metabolism of the Schmitz Bacillus. Studies in Bacterial Metabolism. LXIII.**—*Jl. Infect. Dis.* 1922. Feb. Vol. 30. No. 2. pp. 245–247.

Cultural differences between the Shiga bacillus and the Schmitz bacillus are at once discernible. Shiga's bacillus produces a moderate increase in reaction up to and including the first week of growth, during which time the amount of ammonia formation is minimal and the evidence points to a non-nitrogenous source of energy during that period. Then the reaction becomes alkaline and deamination (ammonia formation) commences. This was explained on the supposition that Shiga's bacillus has a predilection for the carbohydrate fraction of the protein molecule which is not utilized by the Schmitz bacillus. In respect of indol formation Schmitz's bacillus more nearly resembles the Flexner than the Shiga type of bacillus. On the other hand, the inability of the Schmitz bacillus to ferment mannite separates it sharply from the Flexner type.

P. H. M-B.

GARDNER (A. D.). **The Normal Limit of Agglutination for *B. dysenteriae* (Flexner) and the Sensitiveness of Suspensions.**—*Lancet.* 1921. Dec. 17. pp. 1269–1271.

Experiments were made with the same antigen as that used by DAWSON and MOODIE (see this *Bulletin*, Vol. 19, p. 39). Professor DUDGEON's antigen (Flexner-Gallipoli) proved to be a suspension of great sensitiveness and at the same time betrayed no tendency to spontaneous flocculation as compared with suspensions of standard cultures issued from Oxford. Flexner-Gallipoli (Dudgeon) is serologically, in other respects, identical with the Flexner (V) strain used in making the standard emulsions. Just as specific serums give a much higher titre with Flexner-Gallipoli suspensions than with Oxford standard cultures, so do normal serums. Owing to the presence of Flexner agglutinins in normal serums, highly sensitive suspensions are, for the purposes of clinical diagnosis, of no greater value than those which are less sensitive. The limit of normal agglutination of a suspension, or set of suspensions, must be determined before they can be employed in serodiagnosis. Standard suspensions and standard technique are essential for this work.

P. H. M-B.

VINCENT (H.). **Sur la vaccination de l'homme contre la dysenterie bacillaire.**—*C.R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 965–967.

No fewer than 2,175 persons have been inoculated against bacillary dysentery with a polyvalent antidysenteric vaccine. The dose contains 500–750 million bacilli, and it is claimed that epidemics of Shiga dysentery have been thereby curtailed. Immunization is not immediately effected, for it takes 5 or 6 days for antibodies to appear in the blood. Amongst the 2,175 inoculated, 33 cases of dysentery appeared 4 days later. The morbidity rate worked out at 16 per 1,000 amongst the inoculated and 228 per 1,000 amongst the uninoculated. A new series has recently been completed, using a polyvalent vaccine (prepared with 8 races of Shiga, 5 of Flexner, 1 Strong and 3 Hiss); 200 millions were given at a dose. Amongst the uninoculated the case incidence was 70·57 and the mortality rate 1·56 per 1,000; amongst the inoculated the incidence was 8·14 per 1,000 and the mortality nil.

P. H. M-B.

CSERNEL (Eugen). **Beitrag zur Schutzimpfung gegen Dysenterie mittels Serovakzine.** [Preventive Inoculation against Dysentery by Sero-Vaccine.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 53–56.

During the summer of 1917 circumscribed dysentery epidemics broke out in Austria in circumstances favourable for testing the value of preventive inoculation. The vaccine was made from agar cultures of Shiga-Kruse and Flexner-Y bacilli in 6 per cent. saline; the resulting emulsion was counted and a mixture made containing, as far as possible, equal parts of virulent and avirulent organisms. Efforts were made to neutralize the toxicity of the vaccine by the addition of 0·4 cc. antitoxic dysentery serum to each 500 million organisms. The first inoculation consisted of 1 cc., followed eight days later by a second containing the organisms without the admixture of serum. The results obtained in a circumscribed epidemic amongst quarry labourers are given as follows :—

Of those uninoculated 10 per cent. became ill, but after inoculation commenced only an additional seven cases were reported (0·9 per cent.) and the epidemic came to an end, though it continued to simmer in the neighbouring villages.

P. H. M-B.

KANAI (S.). **Dysentery Immunisation in Rabbits by the Oral and Subcutaneous Methods.**—*Brit. Jl. Experim. Path.* 1921. Dec. Vol. 2. No. 6. pp. 256–265.

In appraising the practical value of any method of prophylactic immunization the following points should be considered :—

(1) The degree of immunity obtained ; (2) the intensity of reaction, local and general, produced by the vaccine ; (3) the simplicity of administration.

In view of the reaction which may follow subcutaneous inoculation of Shiga vaccines, and in view of BESREDKA's work on immunization produced by oral administration, Kanai compared various methods of immunization. The 24-hour growth on agar from one Roux bottle was suspended in 20 cc. of sterile normal saline, heated for one hour at 60° C., and measured quantities were mixed with bran and fed to fasting rabbits. Antibody production was determined by means of agglutination tests and the immunity response by intravenous inoculation of living and virulent *B. dysenteriae.* The result of experiments planned on these lines tended to show that a certain degree of immunity to *B. dysenteriae* (Shiga) can be produced in rabbits by the oral administration of vaccines, though the experiment as a whole cannot be regarded as completely satisfactory owing to complicating coccidiosis infection. Ingestion of killed bacilli resulted in the appearance of agglutinins in the serum. Ingestion of even enormous quantities of vaccine had no effect upon the general health of the animal. A greater degree of immunity was obtained by subcutaneous inoculation of carbolized vaccine. The ingestion of bile does not increase the efficacy of oral immunization. In a later series of experiments the vaccine was introduced into the stomach of the rabbit by means of a cannula. In neither instance did any solid immunity result.

P. H. M-B.

SCHULTZ-BASCHO (Paula). **Zur Klinik der Bazillenruhr im Kindesalter.**—*Arch. f. Kinderheilkunde.* Stuttgart. 1921. Apr. 16. Vol. 69. No. 3–4. pp. 269–279.

A discursive paper with no new or interesting information.

P. H. M-B.

MIXED AND UNCLASSED DYSENTERY.

GOÈRÉ (R.). **Les maladies endémo-epidémiques dans le personnel de la marine à Saïgon pendant l'année 1920 ; quelques aperçus sur la pathologie Saïgonnaise et les traitements nouveaux des maladies tropicales.**—*Arch. Méd. et Pharm. Nav.* 1921. Nov.–Dec. Vol. 111. No. 6. pp. 495–509.

Amoebiasis accounts for a considerable proportion of cases in Saigon, especially in the months from April to August. Emetine hydrochloride appears to be as efficacious as elsewhere.

Natives possess a considerably greater immunity against the infection than do Europeans; this was specially noticeable in Annamite and Tonkinese sailors. In amoebic and presuppurative hepatitis intravenous injections of emetine are advocated. Should surgical intervention become necessary, it must be accompanied by emetine therapy.

Amoebic dysentery may be aggravated, or dysenteric symptoms may even be caused, by intestinal helminths, such as Ascaris and Trichocephalus.

In bacillary dysentery injection of antidysenteric serum in large doses is indicated, but serum-sickness is a common sequel in Saigon, and therefore this line of treatment has its drawbacks which are not entirely discounted by previous desensitization by injections of small quantities of serum.

"Diarrhée chronique de Cochinchine," usually known as sprue and also under the soubriquet "Cochinchinette," is becoming rarer, for the reason (so the author avers) that better hygienic conditions of the gut oppose themselves to the development of lactose-fermenting bacilli and yeasts.

P. H. M-B.

KLING (D.). **Zur Kohlebehandlung der Ruhr.** [Charcoal Treatment of Dysentery.]—*Med. Klin.* 1922. Jan. 8. Vol. 18. No. 2. pp. 46–48.

In 1914 SINGER recommended charcoal in the treatment of dysentery, given as an ingredient of a bolus or as an enema. Experience gained in the treatment of over 3,000 cases of dysentery has led the author to doubt the value of this method. One of his patients, apparently convalescent, died suddenly from perforation, and this untoward event he ascribes to the balling of charcoal in the large gut. Two similar fatal cases are cited as having occurred in the practice of his colleagues. In one instance he found that the charcoal was retained for seven days. The charcoal was given in powder form—3 teaspoonfuls daily—well suspended in half a wineglassful of water.

Many experiments have been made on animals with the object of proving that charcoal is capable of absorbing various organic and inorganic poisons when given *per os* and thus rendering them inoperative, but KRUSE has shown that this substance has no action upon living dysentery bacilli. The author is of the opinion that the use of charcoal in bacillary dysentery is contraindicated for the reasons already stated and for its possible mechanical action in preventing the healing of the lacerated mucosa.

P. H. M-B.

WERLÉ (Wilhelm). **Beitrag zur Therapie postdysenterischer Darmstörungen.** [Treatment of Post-Dysenteric Intestinal Symptoms.] —*Muench. Med. Woch.* 1921. Dec. 9. Vol. 68. No. 49. pp. 1581–1582.

A record of no exceptional interest. The patient, a sanitary section officer from Macedonia, contracted a pyrexial attack of dysentery in 1918. Post-dysenteric diarrhoea supervened and persisted for four months after his return to Germany; tannin acid, tannalbin and silver nitrate injections, all failed to cure. With a preparation called "Mutaflor" (composition not stated) improvement rapidly set in and the patient recovered in 2–3 weeks.

P. H. M-B.

BUTTENWIESER. **Azetonurie und experimentelle Adrenalinglykämie bei Ruhr.** [Acetonuria and Experimental Adrenalin Glycaemia in Dysentery.]—*Muench. Med. Woch.* 1922. Jan. 20. Vol. 69. No. 3. p. 83.

As acetone bodies rapidly appear in the urine during starvation, therefore it was not surprising that acetonuria occurred in five out of seven dysentery patients. After the injection of adrenalin in these patients a hyperglycaemia was noted which became more pronounced after administration of 100 gm. of dextrose.

P. H. M-B.

LEVY (Moise D.). **The Treatment of** *Trichomonas intestinalis* **Infections.**—*Amer. Jl. Trop. Med.* 1922. Jan. Vol. 2. No. 1. pp. 71–75.

The author has found 20 per cent. of cases examined infected with *Trichomonas intestinalis*; all give a history of occasional diarrheal attacks and, in several instances, mucus and some blood were present in the evacuations. Using previous observations as a working hypothesis, and bearing in mind HAUGHWOUT's views regarding the chemical changes in the cells and body fluids of the host, a plan of treatment was formulated. The usual preliminary saline purge and liquid diet having been given, calomel gr. 1/10 was ordered every 20 minutes until ten doses had been taken; this dosage is repeated daily for four days each week for four weeks. Dried ox-bile gr. 5–25 in capsule is given three times a day in addition to dil. HCl ♏ 20–40 daily for a month. Should a stool examination at the end of this time show Trichomonads still present, the treatment is repeated.

P. H. M-B.

McGILL (Caroline). **Giardiasis.**—*Jl. Amer. Med. Assoc.* 1922. Jan. 21. Vol. 78. No. 3. pp. 179–180.

The following conclusions are reached, based admittedly on very little evidence:—

Giardiasis is a frequent cause of severe diarrhoea with impairment of general health, though there may be constipation. Practically all the patients suffer from abdominal pain, which may be severe. The parasite may invade the gall-bladder, and when present also in the duodenum may give rise to symptoms resembling those of duodenal ulcer. No treatment yet suggested has been successful, though neoarsphenamin injections (0·3–0·6 gm.), together with benzyl-benzoate, alleviate the symptoms.

P. H. M-B.

i. PEDLEY (Frank G.). **A Case of Giardiasis (Lambliasis) intestinalis.**—*Canadian Med. Assoc. Jl.* 1921. Nov. Vol. 11. No. 11. pp. 829–830.

ii. YAKIMOFF (W. L.) & SOLOWZOFF (A. S.). **Un cas de lambliose guéri par le "Luargol."**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 652–653.

i. Records a case of Giardia infection in a French-Canadian boy, aged 5, who had never been out of Canada.

ii. The authors claim on extremely scanty evidence to have cured a soldier of lambliasis, which was causing vomiting and various intestinal symptoms, by means of intravenous injections of 0·15 gm. of Luargol. The parasites, it is said, immediately disappeared.

P. H. M-B.

BLACKWATER FEVER.

i. Crichlow (Nathaniel). **Blackwater Fever in the Solomon Islands.** —*Jl. Trop. Med. & Hyg.* 1921. Sept. 1. Vol. 24. No. 17. pp. 231–234. With 1 chart in text.

ii. ——. **Further Cases of Blackwater Fever in the British Solomon Islands.**—*Ibid.* Oct. 1. No. 19. pp. 255–257. With 1 text fig.

i. Until recently blackwater fever was unknown in the British Solomon Islands, but of late it has been comparatively common. In a table are given (1) the total number of deaths in the Protectorate, and (2) the number of deaths from blackwater fever. The following factors operated to bring this about.

1. The increase of the European population.
2. The injudicious use of quinine.
3. Repeated attacks of malaria and incomplete treatment.

The author firmly believes that blackwater fever is a disease introduced into the British Solomon Islands. In support of his view that blackwater is caused by some unknown agency, the author states that the disease has occurred in persons without a previous attack of malaria and that new residents are attacked. The length of residence of the cases occurring during 1920 were :—one case 5 months, one 9 months, one 18 months, two 2 years, one 5 years, two 6 years and one 10 years. Malaria and quinine are only predisposing causes, as also are chills, exhaustion and alcoholism.

The paper concludes with an account of the symptoms and treatment.

ii. In this paper the author brings forward further evidence to support his view that blackwater fever was introduced into the British Solomon Islands. It is as follows :—

> In speaking with " an old stager " here, he said that blackwater fever was unknown in the British Solomon Islands until a certain gentleman some years ago died from the disease. This gentleman had the disease previously in West Africa. This was the first known case of blackwater fever in the British Solomon Islands.
>
> Could not the disease have been introduced by him and others who had the disease previously in other tropical countries ?
>
> It will thus appear that blackwater fever is an importation from West Africa. [Comment is needless.]

Warrington Yorke.

Wiggins (C. A.). **Report on Blackwater Fever in Uganda for 1920.**— *Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1920.* pp. 43–47.

The number of cases of the disease in 1920 was 56 with seven deaths. Twenty-one of these cases are reported to have had previous attacks.

European.—One had 3 previous attacks; three had 1 previous attack (one death).

Asiatics.—One had 4 previous attacks ; one had 3 previous attacks ; three had 2 previous attacks ; twelve had 1 previous attack.

Blood examinations were made in all cases, but malarial parasites were found in eight only—in three cases before the attack, in five during the attack.

The summary is as follows :—

" From the above and from a careful perusal of the individual reports the following are some of the conclusions arrived at :—

" 1. *Decreased Case and Death Rates.* I hope that these to some extent may be due to permanent factors such as the general anti-malarial measures in progress, the better acquaintance with the disease and with the necessity for greater individual precautions against malaria and of early and adequate treatment.

" 2. *Exciting and Predisposing Causes and Quinine Habits.* In my opinion there appears to be overwhelming evidence for the following conclusions from the reports received.

" (*a*) That without malaria there would have been no case of blackwater fever.

" (*b*) That the previous attacks of malaria had usually been numerous and in all cases inadequately treated.

"(*c*) That in all cases, except possibly one, the previous administration of quinine can be said with confidence to have nothing to do with the bringing on of the haemoglobinuria. On the other hand cases of blackwater fever occurred when no quinine had been taken for several days, weeks or months, and, in one case, not at all previous to the haemoglobinuria. In the one doubtful case referred to above the patient had been suffering from fever for a week without taking any quinine, then took 30 grains in one day in three doses and developed haemoglobinuria shortly after the third dose.

" 3. One of the patients who died had taken regularly five grains of quinine daily as a prophylactic for one year previously. It is also recorded that he had had very numerous attacks of malaria which were inadequately self-treated by increased doses of quinine. Four other patients also took quinine regularly as a prophylactic ; three of these had the same history of numerous mild and self-treated attacks of fever. This in my experience is not an unusual history in cases of blackwater fever and illustrates one of the objections to indiscriminate quinine prophylaxis in a country where this disease is prevalent. I have no doubt that the prophylactic prevents small malarial infections in many cases, but not large or numerous infections. Mild attacks of fever difficult to diagnose as malaria begin to occur which are only damped down by increased doses of quinine for a few days, and eventually after some additional exciting cause, such as a chill, or over exertion, blackwater fever supervenes. Possibly if the prophylactic quinine had not been taken the first attack of malaria would have been more severe, medical aid called in, and the case adequately treated. Such cases are, of course, more apt to occur in persons isolated from early medical treatment, and in this Protectorate with the ever-present danger of blackwater fever looming ahead, I cannot feel justified in recommending in every case the constant use of quinine as a prophylactic unless under medical supervision. I am convinced that the usual custom is for the average layman to take far too much quinine as a prophylactic and not nearly enough during and after an attack of malaria : a system which invites attacks of blackwater fever.

" 4. The fact that 21 of the total cases had previously suffered from one or more attacks of blackwater fever confirms the conclusion that one attack of this disease predisposes rather than otherwise to further attacks."

W. Y.

PONS. **Etude de la fièvre bilieuse hémoglobinurique dans ses rapports avec le paludisme.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 147–166. With 1 text fig.

In this work, based on a study of 52 cases, the author has attempted to ascertain the relationship between malaria and blackwater fever. The observations were made in Tonkin and Laos.

As a result of examining the distribution of malaria and blackwater in those vast regions, the author concludes that in those places where malaria manifests itself in a severe form blackwater fever occurs, and conversely in places where blackwater is found the malaria is of a severe type.

In a table the various races and tribes are classified, and their sensibility to malaria and blackwater recorded. From this it appears that only the autochthonous inhabitants of malarial zones, infected in their infancy, and inheriting slight immunity, and in whom the malarial manifestations become milder after early childhood, are very resistant to blackwater fever. The inhabitants that have been implanted for a long time in the valley and have fused with the aborigines, exhibit a less marked resistance to malaria and backwater. The tribes living on the hills and those recently installed in the valleys (Occidentals, Chinese and Annamites) suffer most severely from the two diseases.

Blackwater fever does not occur regularly all the year round ; it is an aestivo-autumnal affection. In the third military territory not a single case was observed during the first six months of 1914 ; its appearance coincided with that of the rains, that is, with the malarial period. During the second half of the year, out of 850 men, of which 665 were stationed in the low valleys, 21 developed blackwater fever. On the upper Noire River 38 cases occurred out of 315 men between the period 1 January, 1915, and 28 February, 1916. The monthly incidence of the cases was as follows :—June 9, July 6, August 8, September 2, October 2, November 3, December 4, January 3, February 1. It is noted that the troops were engaged in police operations from November to February. Twenty-three cases are analysed regarding their sojourn in the country before developing blackwater fever ; the information is set out in the following table :—

Sojourn.	Number of Cases.
0–6 months	0
6 months–1 year	2*
1–2 years	3
2–3 ,,	10
3–4 ,,	6
5–6 ,,	2

The decrease in the numbers of cases after three years is due to the fact that the normal tour is 36 months, and consequently only few remained longer.

Discussing the part played by quinine in the production of blackwater, Pons states that each trooper received daily a dose of quinine varying from 0·3 to 0·5 gm., and that all his cases occurred amongst men taking quinine in these doses ; he remarks, however, that the attack usually followed a malarial paroxysm, when the dose of quinine was increased to 0·75 or 1·0 gm. The author does not believe that there is such a condition as quinine haemoglobinuria as distinct from blackwater fever. He points out that during the influenza epidemic quinine was a very favourite drug and yet no instance of haemoglobinuria is recorded as a result of this wholesale drugging with the alkaloid. The haemoglobinuria following quinine is veritable blackwater fever; the organism being "en instance d'hémolyse," the alkaloid determines a crisis by putting into play a hyperactivity of the haemolytic functions of the liver and spleen. Apparently cold exerted no influence in precipitating blackwater.

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* These two cases had made previous tours in the country.

Details of a number of cases are given showing :—

1. Haemoglobinuria following a series of quotidian attacks.
2. Haemoglobinuria following a series of attacks of septan type; the patient had malarial attacks on the 2nd; 13th, 14th, 15th; 21st, 22nd and 23rd; and on the 29th he developed blackwater fever.
3. Haemoglobinuria following an attack of tertian malaria.
4. Haemoglobinuria without any preceding malarial paroxysm. This type was much less common than the others.

Repeated attacks in the same individual are not uncommon; far from confirming a degree of immunity, one attack predisposes to a second. Of 24 cases in which it was possible to obtain definite information, the attack observed by Pons was in one case the seventh, in one the sixth, in one the third, and in six the second.

In conclusion, the author believes that the observations recorded in this paper support the malarial theory of blackwater fever. He is of opinion that blackwater fever occurs in patients suffering from true visceral malaria and that the site of the infection is the liver and spleen.

W. Y.

DE LA POUGE. **Observations concernant des cas de fièvre bilieuse hémoglobinurique.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 82–91. (Discussion, pp. 91–92.)

Clinical details are given of five cases of blackwater fever. The disease is very common in Haut-Laos, but not very fatal, and the Annamites from Cochin China are much more subject to it than are the Annamites of Tonkin.

W. Y.

PARROT (L.). **Nouvelle observation algérienne de fièvre bilieuse hémoglobinurique.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 59–63. With 1 chart in text.

Reference is made to a previous paper [this *Bulletin*, Vol. 6, p. 109] in which the author showed that blackwater fever is an important disease among Europeans of Algeria, not only on account of the number of cases, but also owing to their gravity. During the last six years the disease has not become less prevalent. Although exact figures are not available, the total cases between 1899 and the end of 1920 are estimated at a hundred. Details of one of the last cases are set forth according to the manner prescribed on the schedule devised by STEPHENS [this *Bulletin*, Vol. 5, p. 254].

W. Y.

MORIN (H. G.). **Quinine et fièvre hémoglobinurique.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 139–147. With 1 chart in text.

A detailed account is given of a case of blackwater fever which exhibited haemoglobinuria on 12 occasions during a period of 26 days

The patient had been the subject of malaria for a long period, and the initial attack of blackwater followed the injection of a large dose (1 gm. or 1·5 gm.) of quinine. The alarming symptoms disappeared with symptomatic treatment, but intermittent fever reappeared. Quinine, either intramuscularly or orally, regularly produced a relapse of haemoglobinuria, but quinine alone did not appear to be the cause, since one of the most severe relapses occurred without the previous administration of quinine.

The history of this case is not without interest, the author writes, in that it illustrates the fruitlessness of quinine therapy. Analogous cases are common in tropical medicine; attention is drawn to the well-known fact that many creoles and old European and Asiatic residents are afraid to take quinine when they have fever. The colonial practitioner, as the result of experience, learns to respect the precepts of the old physician, and only administers quinine with a thousand precautions.

The author states, however, that he has treated men profoundly affected with malaria with massive doses of quinine, after the method prevalent in Macedonia, without ever producing haemoglobinuria; these patients were from a detachment of European soldiers who had been less than a year in Madagascar.

Wherein then lies the apparent discrepancy? The author believes that it is to be explained by the fact that the Madagascar cases were only recently infected with malaria, whereas the case detailed above and the great majority of those with which the ordinary Colonial practitioners have to deal are old standing cases. He observes, in support of this, that it has been noted that massive medication with neo-salvarsan is dangerous in old syphilitics and especially in old untreated cases.

W. Y.

PELLETIER (J.) & QUEMENER. **Traitement de la fièvre bilieuse hémoglobinurique par des injections intraveineuses de cyanure de mercure.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 226–228.

The authors' attention has been arrested by two recent papers on blackwater fever, the one by MUNOZ recommending 1 cgm. of cyanide of mercury every 24 hours as treatment [this *Bulletin*, Vol. 15, p. 431], and the other by NOC drawing attention to the presence of spirochaetes (post-mortem) in the liver of a European who had died of blackwater fever [vol. 17, p. 369.]

Details are given of six cases of the disease treated with cyanide of mercury; all recovered.

The conclusion is that the drug has an excellent action in blackwater fever; under its influence the haemoglobinuria rapidly disappears. The favourable action of this drug seems to support the view that the disease is due to a spirochaete.

[It is necessary to point out yet once more that conclusions of this nature based on the observation of so few cases are entirely unwarrantable; no positive conclusion can be drawn from the fact that six cases recovered, when it is well known that 70 or 80 per cent. of all cases of the disease recover whatever treatment be administered.]

W. Y.

WALLACE (A. F.). **A Note on the Treatment of Suppression in Blackwater Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 129–130.

The attack of blackwater commenced on May 28, and the patient was first seen by the author the next morning. There was constant bilious vomiting and nothing was retained. Rectal salines were given for two days and then intravenous salines; up to June 2 over 7 pints had been injected. On June 3 the condition seemed hopeless, and from May 31 only 1⅞ oz. of urine had been voided. The author then tried large hot irrigations with normal saline with double-current rectal tubes, as recommended in Osler's "Practice of Medicine." Two thin oesophageal tubes (size 20) were stitched together side by side, the tip of one being 3 in. lower than the other, and these were then passed per rectum high up in the bowel. At first every hour, and later every four hours, 4 pints of saline, as hot as the patient could bear, were run in from a douche can. The urine steadily increased in volume day by day, and on June 3, 2 oz., June 4, 3¼ oz., June 5, 5 oz., June 6, 15 oz., June 7, 24 oz., June 8, 61 oz., June 9, 89 oz., and June 10, 146 oz. were passed.

The author is of opinion that the method should be tried in any case of suppression.

W. Y.

THORNHILL (F. M.). **Malarial Hemoglobinuria.**—*New Orleans Med. & Surg. Jl.* 1921. Oct. Vol. 74. No. 4. pp. 224–232.

This paper was written 18 years ago and, it is stated in the preface, presents the views held on the subject commencing practically half a century ago.

W. Y.

DALEPPA (K.). **Blackwater Fever in Khondmals, Orissa.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. p. 299. With 1 chart.

HARSANT (A. G.). **A Case of Blackwater Fever occurring in Mesopotamia.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 384–386. With 1 chart in text.

UNDULANT FEVER.

FLEISCHNER (E. C.), VECKI (M.), SHAW (E. B.) & MEYER (K. F.). **The Pathogenicity of** *B. abortus* **and** *B. melitensis* **for Monkeys. Studies of the Genus Brucella Nov. Gen. III.**—*Jl. Infect. Dis.* 1921. Dec. Vol. 29. No. 6. pp. 663–698. With 4 charts in text.

This is a continuation of previous work to show the relationship of *B. abortus* Bang to *B. melitensis* (using the authors' nomenclature) [see this *Bulletin*, Vol. 16, p. 412]. As few tests had been carried out on monkeys, these were used for the experiments, the clinical results of infection being observed, and the virulence of the organisms tested. The work done is fully described. The cultures of *B. abortus* were pathogenic to guinea-pigs, and this organism could not be separated from *melitensis* by morphology, culture, or ordinary serum tests. Intravenous injections in one monkey gave rise to a typical infection ; in two others the results were less conclusive. When monkeys received with their food a *B. abortus* strain of low virulence, three out of six became infected, but two of the former had present in the gut an entozoal parasite, *Oesophagostomum*, which probably favoured infection. Guinea-pigs fed on the stools, however, did not contract the abortus infection. The higher the virulence of the strain, the quicker was the infection produced. The milk of artificially infected cows fed in large doses to four monkeys gave three negative results. Goats were infected and successive passages were made by injecting into the udders of other goats, converting a bovine strain into a caprine strain ; the milk used for feeding gave partially successful results. From these experiments it appears that *B. abortus* infection is not readily caused in monkeys which are fed on naturally infected goats' milk, and it was proved that animals which did not become infected this way were not immune, as heavy doses of the organism given on carrots were infective. They found that monkeys could not be infected via the alimentary canal by a relative small number of *B. abortus*, even when the diet was continued for over 30 days, *a result which differs fundamentally from that obtained by the use of B. melitensis.*

A fact of great epidemiological importance is that calves which are exposed to infection during the first three or four months, and known to have ingested infected milk, become immune. Abortus serum contains both specific and non-specific agglutinins ; it is necessary when carrying out tests to heat the serum as recommended by NICOLLE for melitensis serum. These agglutinins are formed only in the presence of a definite infection ; the use of killed autolysed abortion bacilli is antigenically ineffective in monkeys. The microscopical changes produced by *B. melitensis* or by a heavy abortus infection in monkeys resemble those of an early typhoid infection. In answer to the question, is *B. abortus* pathogenic to man ? they say that at present it appears that it is non-pathogenic, though MOHLER & TRAUM, by inoculating guinea-pigs, found *B. abortus* present in 1 out of 56 tonsils obtained from children, and SEDGWICK and others found specific agglutinins for *B. abortus* in a small percentage of children examined. The authors tested 50 children with negative results, and NICHOLL & PRATT in repeated examinations obtained no positive results.

The work is summarized as follows :—(1) Virulent strains of *B. abortus* in sufficiently large doses are pathogenic to monkeys ; (2) *B. melitensis* is far more invasive than *B. abortus*. One or two feedings of one-thousandth the amount necessary to cause an infection with *B. abortus* is sufficient in melitensis infection to parasitize a monkey.

P. W. Bassett-Smith.

KHALED (E.). **A Comparative Study of Bovine Abortion and Undulant Fever, from the Bacteriological Point of View.**—*Jl. of Hygiene.* 1921. Dec. Vol. 20. No. 4. pp. 319–329. With 2 charts.

The work was carried out at the Lister Institute. Thirty strains of the organisms were tested against rabbits' serum immunized with the three organisms, *melitensis*, *abortus*, and *paramelitensis*. No morphological distinction could be made between the three, described as small rods 3–5 μ long, with somewhat pointed ends, pleomorphic, the same strain showing bacilli, cocco-bacilli, and cocci, non-motile, and Gram negative. [It is important to remember that, as originally described by BRUCE, and as is generally known, the organism was 0·3 μ in diameter. This still remains good in freshly-isolated cultures.] Abortus infection is stated to be chiefly due to food infected from the placenta. The incubative period is 32–230 days. There is catarrh of the genital passages, loss of milk, and abortion ; the animals generally recover, but remain sterile or abort again. The disease is highly infective, and rapidly spreads through a herd, the males acting as " carriers " ; about 25 per cent. of animals are infected in England, many more on the Continent and America. This disease and undulant fever present a picture of bacteriaemia with a close similarity of the modes of infection and excretion of the organism, but the author is wrong when he states that in undulant fever enlargement of the testicle is found in a great proportion of the cases. As the morphological and cultural characters gave no distinctive differences, agglutinative tests were made with the following results :—

1. With melitensis serum, melitensis and abortus organisms agglutinated equally, paramelitensis less so.
2. With abortus serum the abortus titre was a little higher than the melitensis, and still more than the paramelitensis.
3. With paramelitensis serum, paramelitensis agglutinated up to 1/6,400, melitensis up to 200, and abortus to 100–200.

The four groups described by SHAW and FEUSIER were not substantiated [see this *Bulletin*, Vol. 16, p. 412]. Absorption tests showed that :—

1. When melitensis serum was fully absorbed with melitensis organisms all agglutinins for both melitensis and abortus were removed.
2. When melitensis serum was fully absorbed with abortus organism the results were similar.
3. When abortus serum was fully absorbed with abortus organism all agglutinins were again removed.
4. When abortus serum was fully absorbed with melitensis organism it failed to agglutinate with the melitensis strain but agglutinated the abortus strain to the full titre.

From this it is gathered that *B. melitensis* is a substrain of *B. abortus* ; the use of the generic term *Brucella* is advised for the group. With guinea-pigs the melitensis strains were about six times more virulent than the abortus ones. A single cross immunization experiment with a monkey showed that inoculation of abortus into the animal protected it from an infection with a quantity of melitensis organism which produced a typical fever in a control monkey. In the author's opinion, there seems to be no reason, apart from the low virulence and the large dose which would be required, against a febrile affection being produced in man from ingestion of abortus-infected milk, but the fact remains that abortus-infected milk is common and undulant fever very rare in England; it is, however, possible that some slight immunity may be acquired by constant ingestion of infected milk. No definite conclusion is drawn as to whether the species are one and the same, but the cross immunity experiment favours this view.

[This investigation in almost all points corroborates the work done on the subject in America, and the group seems to be a very definite one.]

P. W. B-S.

ZUCCARELLI (S.). **Fièvre méditerranéenne ou de Malte en Corse.**—*Bull. Acad. Méd.* 1921. Dec. 20. Vol. 86. 3rd Ser. No. 42. pp. 423–425.

Twenty years ago undulant fever was very rare in Corsica, but in 1912 the author found that it had spread widely and was a source of great danger; he publicly drew attention to the fact and recommended preventive measures. It is now endemic all over the island, and he points out that the same measures should be carried out in Corsica to eradicate the disease as were used so successfully by SERGENT in Algeria.

P. W. B-S.

CORDEIRO (Filipe Pinto). **Existe febre de Malta em Goa?** [Does Undulant Fever occur in Goa?]—*Bol. Ger. Med. e Farmacia.* Nova Goa. 1919. July. Vol. 5. No. 7. pp. 255–256. (Discussion p. 256.)

Undulant fever has only recently been recognized—by the agglutination test—in Goa. Cases of prolonged fever have been regarded usually as typhoid and kept on a low diet, with death as a frequent sequel. Other diagnoses were rheumatic fever or tuberculosis. The suggested source is goats from Gajarat, the milk of which is drunk.

A. G. B.

RÉMOND (A.) & MINVIELLE. **Note sur un cas de fièvre de Malte.**—*Bull. Acad. Méd.* 1921. Oct. 4. Vol. 86. Ser. 3. No. 31. pp. 135–136.

The patient was a Spaniard, aged 36, a wood-cutter by trade. A possible source of infection was the milk (always supposed to be boiled) of a goat kept in the house. The chief clinical peculiarities were, the sudden onset with pulmonary symptoms, the absence of pains and sweats and of true apyrexial periods. The diagnosis was confirmed by a positive blood culture, and the high agglutination reaction of the serum (1 in 12,000) carried out at the Pasteur Institute, Paris.

P. W. B-S.

CIGNOZZI (Oreste). **La coxoposite nella febbre maltese simulante la tubercolosi dell'anca.** [Arthralgia of the Hip in Undulant Fever simulating Pott's Disease.]—*Riforma Med.* 1921. July 16. Vol. 37. No. 29. pp. 674–675.

The occurrence of suppurative conditions associated with undulant fever has interested the author since 1911. He now describes two cases of children, aged 7 and 8 respectively, who had prolonged fever with hip joint symptoms, and positive serum reactions having a titre of 1 in 100 with the *M. melitensis*. He emphasises the importance of serum tests, in such cases which simulate Pott's disease, and the value of serum therapy.

P. W. B-S.

LOMBARD (Pierre) & BÉGUET (Maurice). **Orchite suppurée due au** *Micrococcus melitensis*.—*Presse Méd.* 1921. Sept. 21. No. 76. pp. 753–754.

A metastatic inflammation of the testicle and epididymis occurs in about 6 per cent. of undulant fever cases; it is quite exceptional for suppuration to follow. Five examples have been recently recorded, but only in the authors' case was a complete bacteriological examination made, as a result of which the *M. melitensis* was isolated in pure culture from the testicular pus. The affected organ was removed, antimelitensis vaccine was given, and the patient left the hospital cured. Tuberculosis was negatived by animal experiment. A full description is given of cases described by CANTALOUBE and CASSUTO. Suppurative orchitis is a very grave complication, as separate foci tend to be distributed; the gland is practically always destroyed and the amount of pus may be very large. During the course of the fever the diagnosis is easy, but after convalescence it is more difficult, as there are no specific signs beyond those obtained by bacteriological methods. [The micrococcus produces in tissues, first, signs of local irritation, then fibrosis, which may go on to necrosis or formation of cold abscesses. Such abscesses have frequently been described over costochondral joints from which no organism, or only the *M. melitensis*, has been recovered. This occurrence is rare in the testicle. Recent work has shown that the *M. paramelitensis* is more pyogenic than the *M. melitensis*, and it is possible that this case from Algiers was due to the former organism.]

P. W. B-S.

CARINI (Alfredo). **Phenololipoid N. in Experimental Infection by** *Micrococcus melitensis*. **(Chemotherapic Notes.)**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 2. Vol. 25. No. 1. pp. 1–2.

Piazzo's phenololipoid N. is supposed to have both antitoxic and antibactericidal properties. In cases of undulant fever these two factors are required for successful treatment. The author found that in vitro short exposures of the organism to moderate dilutions were effective, viz., 15 minutes of 1 in 20. Guinea-pigs which had received lethal doses of the *M. melitensis*, when treated with 1 cc. of a 10 per cent. solution of the drug in oil, given subcutaneously for an average of eight days, nearly all survived and appeared to have been cured. It was therefore considered proved that phenololipoid N. in experimental infections of *M. melitensis* possessed energetic antibactericidal and antitoxic properties.

[These experiments on guinea-pigs will require to be repeated on monkeys before any definite conclusions as to the curative value can be reached.]

P. W. B-S.

BURNET (E.). **Sur un nouveau procédé de diagnostic de la fièvre méditerranéenne.**—*C.R. Acad. Sci.* 1922. Feb. 6. Vol. 174. No. 6. pp. 421–423.

The author's method is an intradermal inoculation of a filtrate of a culture of the *M. melitensis*, which has been shown to give specific reactions in guinea-pigs and man. In eight cases of undulant fever proved by serum reaction or blood culture the result was distinctive, in acute cases from the 12th to the 35th day, and in convalescents up to three and a half months; in a cured case after 18 months the result was negative. The filtrate is made from broth cultures, preferably one month old, passed through a Chamberland bougie; this is only slightly attenuated if boiled for one minute, and phenolizing does not reduce its activity. From seven hours after the inoculation of one drop intradermally, there is redness, slight *local oedema*, and perhaps a little pain; the zone extends 4–6 cm. and has a definite margin. In control cases subcutaneous inoculation caused slight oedema and pain, but the intradermal no reaction. The test is looked upon as simple and sure; it is always applicable and quite free from danger. Further work is being carried out on these lines on goats, and the questions of duration of activity of the filtrate, its preservation, sensibility of subjects, and the anatomical and physiological characters of the reaction have still to be studied.

[The filtrate would contain the exo- and endotoxins of the *M. melitensis* plus proteins from the broth; saline emulsions from agar cultures would probably be better.]

P. W. B-S.

TRIPPUTI (Vincenzo). **Sopra un caso di infezione associata tifo-melitense.**—*Pediatria.* 1922. Feb. 1. Vol. 30. No. 3. pp. 129–133. With 1 chart.

The author reports a case of mixed infection of typhoid and undulant fever, proved by the isolation of *B. typhosus* from the blood and *M. melitensis* from the urine, with their specific agglutinations. The patient was a child aged 11, a resident of Palermo. Treatment was mainly by vaccines, antityphoid given intravenously (4), followed by antimelitensis given subcutaneously. Improvement was rapid and at the time of this record there was no relapse.

P. W. B-S.

BOOK REVIEWS.

SELWYN-CLARKE (P. S.). **A Monograph on Smallpox in the Negro and Negroid Tribes of British West Africa, with Special Reference to the Gold Coast Colony.**—74 pp. With 1 plate and 1 chart. London : John Bale, Sons & Danielsson, Ltd., 83–91, Great Titchfield Street, W.1.

Medical knowledge always appears to progress irregularly—great discoveries are made, enthusiastic application ensues, followed by long periods when, investigators resting on their oars, the boat of knowledge drifts backwards and forwards on the tide of personal opinion and no progress can be recognized. Too often do we continue to accept statements and theories without submitting them to rigid criticism in the light of data obtained under perhaps some slightly varying conditions. The study of such diseases as pneumonia, typhoid, pellagra and syphilis among natives of tropical countries has already yielded much of value. For such reasons Dr. Selwyn-Clarke is to be congratulated on having seized the opportunity presented by an outbreak of smallpox in Accra during 1920 to put on record his observations on that disease and the problems involved in dealing with the epidemic, and we welcome the Monograph, originally presented as a thesis for the Doctorate of Medicine of London University, in published form.

He has put on record his clinical findings regarding the 264 cases of smallpox among natives which came under his notice, and has used this information to make a comparison between the disease as observed among Gold Coast natives and as described in other countries, while the latter half of the monograph deals with administrative provisions and preventive measures.

In the first place this essay will carry conviction as to the necessity for reform in administrative provisions. The Vaccination Ordinance was not in force in the early part of the year 1920, with the result that there was a highly susceptible community. There was no Infectious Diseases Notification Ordinance, and compulsory notification by the general practitioner and others was only enforced after an order in council under the Quarantine Ordinance had been made. There was a non-sufficient sanitary substaff, with the result that a case of smallpox lay hidden in a native hut near the market-place for three weeks before discovery, a case which was responsible for the infection of 68 other persons. The supply of lymph from England was inadequate. Dr. Selwyn-Clarke's account of this epidemic will have brought these questions to the notice of responsible authorities.

The administrative provisions and preventive measures have, however, little general interest. They must depend, in dealing with epidemic disease in native populations, so greatly on local conditions and call for imagination and ingenuity on the part of the officials who have to take action.

The author found that desiccated lymph was practically useless, but had good results with lanolated vaccine lymph used within two weeks, and since the beginning of the epidemic to the time of writing he had seen vaccination carried out with success in some 90 per cent. of the total inhabitants, numbering nearly 80,000.

The statistics of the epidemic show that of the 264 cases, 8 were examples of Purpura variolosa, *i.e.*, 3 per cent. ; none of these had previously been successfully vaccinated ; 7 of them died. There were 6 cases of Haemorrhagic pustular smallpox (2 per cent.), none of whom had been vaccinated ; mortality 100 per cent. 199 cases of Variola vera were seen (75 per cent.), with a mortality of 27·6 per cent. ; none of these had been successfully vaccinated, except 3, in whom the point was doubtful. Of these 199, 125 had confluent smallpox, with mortality of 37·6 per cent., and 74 showed a discrete eruption, with mortality of 10·8 per cent. 51 cases of Varioloid were noted (19·3 per cent.), 66·6 per cent. of whom had been vaccinated, and no deaths occurred in this group. Of the 64 cases with fatal issue, none had been successfully vaccinated, while of 34 cases previously vaccinated, 12 prior to exposure and 22 subsequent to exposure to infection, none died and all were modified. No case of Variola sine eruptione was noted and attention is drawn to the fact that no cases of Alastrim were seen. A high attack rate and mortality were found among children under five years of age; between 10–15 years, the mortality was only 3·2 per cent., but among the individuals included in the age period 35–45, it rose to 41·4 per cent. A single instance of second attack was met with in an old man of 65, who had been vaccinated seven years previous to the second attack, the first attack being at the age of 20.

Dr. Selwyn-Clarke concludes that the general symptomatology varied little from the disease in Europe and that complications and sequelae did not differ materially in the native as compared with the European, but he points out that initial rashes in natives of West Africa are rare, that the secondary rise of temperature is commonly absent, and that patients remain without mental impairment till the hour of their death, and he lists among complications bronchitis, broncho-pneumonia, enteritis, boils, deep-seated abscesses, sloughing of skin, keratitis, and single cases of arthritis and parotitis. He refers to the difficulty in differential diagnosis in natives, and to the use made of vaccination as an aid. The effect of irritation due to mode of dress or other cause in affecting the distribution of the eruption is alluded to in a striking manner, and a number of cases illustrating the results and effects of vaccination at different stages of incubation are interesting and parallel a similar set of experiments made by the reviewer among African natives 10 years ago.

One would like to suggest that the findings in the epidemic under review are not necessarily a criterion of what may be met with in another visitation. The present writer has seen epidemics of smallpox among natives in East Central Africa which varied very greatly in virulence and infectivity, not only in different years, but in adjoining areas at the same time. As an instance, in one epidemic, some 50 infants under two years of age, and breast-fed by mothers, who were at the time immune (due to having had the disease or been vaccinated), contracted smallpox with no mortality among them, while the death-rate among the older inhabitants was considerable. At the time a number of the points alluded to by Dr. Selwyn-Clarke were recorded: cases of second attack, the apparent rarity of initial rashes, etc. A single case of Variola sine eruptione was seen, and alastrim is, of course, found in Central Africa, and is also known to occur in West Africa.

It is to be hoped that Dr. Selwyn-Clarke will have the opportunity of studying any further epidemics which may occur, and the whole question of the degree of immunity and its relation to smallpox, vaccinia and alastrim is one which invites further research.

Hugh S. Stannus.

VAN LOON (F. H.). [In Dutch and English]. **Het Krankzinnigenvraagstuk in Atjeh.—The Problem of Lunacy in Acheen.** —*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 10. pp. 2–49. With 1 plate.

With the whole question of the treatment of Insanity so much to the front in the public mind, with the ears ringing with the criticisms raining down on such measures as are in force in this and other civilized European countries, one can experience a great feeling of relief and reassurance by turning to Dr. van Loon's article on "The Problem of Lunacy in Acheen"; for here one is taken right back to the beginning of things psychiatrical, the author is treading virgin soil, and the story he has to tell is most interesting and instructive.

Acheen and its Dependencies comprise the territory, under Dutch administration, forming the northern extremity of the island of Sumatra. The district is populated by a fairly distinct race, the Achinese, with a certain admixture of Malays, Javanese, Chinese, etc. Apparently the Achinese were of a certain degree of cultivation, they had a fairly well organized system of native rule by Chiefs, they were united for purposes of defence, and, in addition to the purely agricultural life, they showed a marked artistic trend in the manufacture of ornamental cloths, etc. For the last fifty years there has been a state of open warfare directed against the Dutch attempts to hold and pacify the country, and only recently has the Dutch administration become at all settled.

As their hold on the land became more secure, the Dutch authorities established various military and civil hospitals and prisons at the central administrative points, and these prisons had been used for segregating, not only the criminal offenders, but also those mental cases whose disorderly conduct was so gross as to make them a source of danger to the community at large. Originally, no doubt, such cases were derived from very localized areas of administration and were extremely few in number, but as the process of pacification went on, the native chiefs of the interior came to realize how comfortably they could get rid of their troublesome lunatics, so the cases began to come in more and more from ever widening areas of the country.

It is interesting to note that there was no question of anything being done, in the way of help or treatment, for the individual case; the matter was simply one of social convenience, and the situation developed until, finally, it was the extraordinary accumulation of mental cases in the various gaols, and the nuisance they constituted in regard to the administration of those institutions, that called the attention of the Governor of Acheen to the matter, and led to Dr. van Loon being directed to make a tour of inspection with a view to recommending some solution of the problem.

In all, the author examined some 200 odd cases out of the 1,100 which had been reported, of which the great bulk were made up by Dementia Praecox, General Paralysis and other Syphilitic Cerebral conditions, and Acute Maniacal and Confusional states. All forms of mental disorder known in European countries were represented, and on the whole, the type of conduct exhibited and the comparative frequency of each variety conformed to the general experience of mental disorder in any part of the globe. A few of the cases he examined he found to be quite recovered. In one or two such instances it was clear that the patient had been well for some years, but the local authority of the institution of detention would not take the responsibility of releasing the patient; on the other hand, however, several cases were brought up to him which had been discharged from other institutions and had obviously not recovered.

While the condition of the patients confined in the prisons or in the refractory blocks of the military hospitals was bad, that of the unfortunate patient who became violent in some area where there was no detaining institution was infinitely worse. The practice in such a case was to lock the patient up in a pillory or in a block, which kept the body in a bent attitude and therefore prevented any danger of assault upon any other member of the community; the block or pillory would then be chained to a post or tree and the patient left to face the rest of his or her life under those conditions. The author saw several cases which had been kept pilloried in this way continually for periods of from two to thirteen years on end, and in which there were marked contractures and wasting of limbs due to the enforced and constrained attitudes adopted; indeed it appeared to him that, once a patient was locked up in this way, there was a strong probability of the limbs never again being restored to freedom by release.

Dr. van Loon reserves his decision as to whether the actual number of insane in Acheen is in excess of expectation: he feels that on the one hand the native chiefs may have included only the openly dangerous cases in their lists, in which event the true number of mentally disordered must be much larger than appears and would certainly be excessive; on the other hand, however, he feels that it is quite possible that they are shrewdly including all sorts of troublesome people whether insane or not. In any case, he sees a striking need for the provision of a properly equipped and staffed asylum for the undoubted large number of untreated and uncared-for insane of the country.

In his opinion, the years of suppressive warfare carried on by the Dutch in establishing their hold on the country have resulted in the elimination of the best of the native population. The years of chronic terror and disturbance have not been without effect on the mental stability of a race which is normally emotional and highly strung. Also, the mixing of East and West, as usual, has resulted in the native taking to the worst of the habits of the newcomer, so that the former active and alert Achinese has degenerated into the present indolent, dull, easy going, and dissolute native. The author feels that it is due from the Dutch authorities, as having been the main cause of introducing these degenerative factors, to take steps to deal with the situation and to see that proper facilities are provided, in accordance with the more modern and enlightened views, for the treatment of such individuals under their protection as are unfortunate enough to develop mental disorder.

The article is well written and descriptive. In the English translation there are a few errors of grammar and spelling which could easily have been rectified; these do not, however, interfere with the easy reading and general sense of the production, and the article will repay in its interest for the little time required for its perusal.

Thomas Beaton.

MARTINI (E.). **Berechnungen und Beobachtungen zur Epidemiologie und Bekämpfung der Malaria auf Grund von Balkanerfahrungen.** [Computations and Observations relating to the Epidemiology and Prophylaxis of Malaria based on Balkan Experiences.]—108 pp. With 6 text figs. 1921. Hamburg: W. Gente, Wissenschaftlicher Verlag. [Price 15 Mks.]

In essentials this is a mathematical treatise aimed at establishing the writer's well-known views on the unity theory of malaria. But if one penetrates the forest of algebraical formulae, the soil from which these equations rise is a curious one. It is assumed that for statistical purposes it is sufficient to treat as equivalents primary infection and first treatment, and again relapse and second treatment. But there are grave objections to considering as synonymous either infection and initial symptoms, or relapse and secondary attacks, quite apart from the dissociation which must have occurred in the Balkans between symptoms and treatment. Martini himself emphasizes the fact that there occurred in the Balkans cases in which illness and treatment were postponed for months after infection, although it is perhaps unlikely that they were sufficiently numerous to vitiate statistics seriously. On the other hand, to assume, without evidence, that, where infection was so readily obtainable as it was in the Balkans, every case of second illness was relapse and not a fresh infection is quite unwarrantable. It seems inconceivable that many of these consecutive illnesses were not due to consecutive infections. The basis from which this part of the equations arises is accordingly a precarious one. Martini is convinced, nevertheless, that the facts can be made to fit the unity theory. Possibly. But the theory would be more convincing did it follow naturally from a consideration of all the facts, and did its exponents agree among themselves upon, for instance, such an essential matter as the possibility of primary latency of infection.

The cause of latency or activation of the benign tertian form is held to lie in the action of sunlight on host or parasite, much sunlight bringing about more relapses, and so more primary cases in the spring, and explaining, at least partially, the heavier infection in southern lands and the greater malarial incidence on the fair than on the dark skinned. There is none of these statements or conclusions which has not been emphatically contradicted. A table details excellently the differences in form between the two tertian parasites, both in the mosquito and in man.

Clayton Lane.

Indian Science Congress Handbook, for the use of members attending the ninth meeting to be held at Madras from the thirtieth of January to the fourth of February, 1922. Edited by Newcomb (Clive) [Chemical Examiner, Madras].—x + 165 pp. With 1 folding map. 1921. Madras: Printed at the Madras Diocesan Press.

This hospitable little book, addressed particularly to the members of the Indian Science Congress now visiting Madras for their ninth assemblage, contains a large amount of concise and precise information of general interest.

In its historical chapters we are reminded that Fort Saint George, the nucleus of the old city of Madras, was founded in 1639; and that in the vicinity of the Church of St. Mary, the oldest British building in India, built by the " devotion of the indomitable Sir Streynsham Master," and consecrated (by a proxy for the Bishop of London, whose diocese then included India) in 1680, there still stands the tombstone of David Yale, son of Elihu Yale, the founder of Yale University. The bible used by Streynsham Master, and the silver alms-dish given by Elihu Yale, who was Governor of Madras in 1687, are still in the church; and the church registers contain all the births, marriages and deaths from 1680 to the present time. In the review of interesting historical events we find mention also of Pollilore, the scene of Baillie's " famous last stand . . . . where his last 500 men, without ammunition, repelled thirteen attacks of Hyder Ali's army of 86,000 men before finally surrendering."

The present city and corporation of Madras are humourously touched off by Mr. J. C. Molony, who remarks that the " Corporation might find scriptural warrant for being puffed up, on the score that all men, or at least a good many men, daily speak ill of it." The municipal area, however, is large—some 27 square miles—and the municipal income is small—less than 37½ lakhs of rupees (under £250,000)—yet the much-abused corporation can contend that every day of the year it provides more than half a million persons with generally good drinking water—more than 25 gallons per head in a continuous supply—and removes 350 tons of rubbish from the streets, and carries away nine million gallons of sewage from human habitations, and maintains about 300 miles of metalled roads, which are now in course of being lighted by electricity.

From the engineer to the corporation, Mr. J. W. Madeley, we learn some particulars of the city water-supply and waterworks. The artificial lakes that, among other useful purposes, supply Madras with water, are fed from a catchment area of about a thousand square miles. After screening and rough filtering, the intake destined for the city is led in a culvert seven miles long to the sand filters, consisting individually of a layer of clean siliceous river sand 28 inches deep, over two layers, each two inches deep, of broken granite, below which are brick drains, composed of two layers of pressed bricks. From the filters the water flows into underground tanks and gravitates thence to the pumping station. The filters generally work well, but since sand filtration cannot be trusted to remove all disease-germs it has been decided to adopt some supplementary process of chlorination, and experiments are now afoot to that end.

The port engineer contributes a short account of the Madras harbourworks, which have had a somewhat chequered history since their origination in 1875. The last disaster, in 1916, was a cyclone of such violence that it swept away a 5,000-ton monolithic bastion with about 130 feet of breakwater.

Apposite authorities describe the Museum and Public Library, and the educational machinery, both general and technical. There are in and about the city 10 colleges, including the Medical College, the College of Engineering, the Teachers' College and the Law College, affiliated to the University. There are also 51 secondary schools (31 for boys and 20 for girls), and several technical schools, including a medical school for training medical subordinates, and a veterinary college. The Medical College was opened as a medical school in 1836, and became a constituent college of the University in 1877; its more important recent additions are the laboratories of physiology, hygiene and bacteriology, biology, and physics; the present staff consists of 13 professors, 2 lecturers, 24 assistants to professors and 12 demonstrators; and the staff administers seven separate departments, three of which are for post-graduates.

Major CUNNINGHAM, I.M.S., gives some interesting particulars of the King Institute of Preventive Medicine, which, beginning as a depot for the supply of vaccine lymph to the Madras Presidency, has now developed further into a bacteriological and a public health laboratory for the Presidency. The Institute is well known to the world through the work of Colonel KING on vaccine, of Colonel CLEMESHA on water purification in the tropics, and of Majors CHRISTOPHERS, PATTON and CRAGG on medical zoology.

In an interesting chapter on the history of biology in Madras we are reminded by Dr. E. H. GRAVELY that the old East India Company was not unmindful of the claims of science, since some of the most famous names in the annals of Indian natural history are those of men who began their career as surgeons and official naturalists to the Company. Several of the most celebrated of these were connected with the Madras establishment, to wit, Patrick RUSSELL (1782), famous for his work on Coromandel serpents and Coromandel fishes; William ROXBURGH, Father of Indian Botany, whose works on the Flora of Coromandel and *Flora Indica* still preserve their savour; Robert WIGHT (1819), a botanist of almost equal class, whose work has equal endurance; T. C. JERDON (1835), whose name is still a household word among ornithologists and mammalists; and Francis DAY (1852); author of the classical volumes on the Fishes of India. Among other Madras worthies whose name will not die stands Colonel BEDDOME, of the Indian Army, who wrote what is still the standard work on the ferns of India.

Mr. HORNELL, Director of Fisheries, supplies a chapter full of information and suggestion on some problems of marine zoology in South India, touching, *inter alia*, on distribution, commensalism, and parasitism. It is interesting to learn that experiments are being carried out for acclimatizing in inland waters some of those marine fishes that, having estuarine proclivities, may be assumed to possess some occasional and incipient tolerance of fresh water, and that in the case of two such species the experiments have been successful. Similar experiments with estuarine crustacea are projected.

Other chapters of well sustained interest deal severally with the Anthropology of South India—a field of peculiar richness and diversity, Prehistoric Archaeology in Madras, and the Geology of the Presidency; and finally there is an account of the Agricultural College at Coimbatore.

It is to be assumed with some confidence that the members of the Indian Science Congress will have been edified and impressed alike by the contents of this wonderful little packet of assimilative instruction and by the inspiration that conceived it and the imagination that gave it shape.

A. Alcock.

TROPICAL DISEASES BUREAU.

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MEDICAL HELMINTHOLOGY: A REVIEW.—PART I.

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INTRODUCTION.

Of the many notable advances made in our knowledge of the parasitic worms during the past ten years, probably among the most important in relation to preventive medicine were those dealing with:—

(A) The elucidation of the life-histories of *Paragonimus westermanii, Clonorchis sinensis*, and the Bilharzia worms, of *Dibothriocephalus latus* and *Sparganum mansoni*, and of *Ascaris lumbricoides* and *Loa loa*.

(B) The recognition of the importance in diagnosis and classification of the characteristic design of the helminth egg, the consequent elaboration of methods whereby these eggs could be easily and rapidly recovered from the discharges of the living patient, and the utilization of the method of microscopical diagnosis in eradication campaigns.

(C) The application of serological methods to the diagnosis of helminth infections.

(D) The intensive study on a large scale of the anthelminthic values of drugs and of the best and safest methods for their administration.

(E) The methods whereby helminth infections could be best controlled through supervisory control of food, intermediate hosts and night soil.

Of less immediate interest, although of scientific and possibly ultimately of practical importance, are those dealing in the (*a*) extensions in the known geographical distribution, notably of Onchocerca and Heterophyes; (*b*) the occasional or innocuous occurrence in man of parasites found in domesticated animals; (*c*) changes in nomenclature consequent upon advances in general systematic studies of the group, or upon subsequent identification of parasites regarded as peculiar to man with forms previously recorded in other animals.

PLATYHELMIA—TREMATODA (Hermaphroditic forms).

Paragonimus westermanii.

COBBOLD's surmise that a crustacean might prove to be the intermediate host of the lung fluke was confirmed by KOBAYASHI in 1917 and NAKAGAWA in 1918. Previous to this, however, MORIYASU, ARIMA and TANAKA in 1914 had induced infection experimentally in dogs by feeding to them crabs collected from an island in the mouth of the Han River in Korea, where over 30 per cent. were found to harbour encysted cercariae. NAKAGAWA, who worked at this subject in Formosa, reported in 1916 that cercariae occurred naturally in *Melania libertina* and *M. obliquegranosa* and that *Potamon obtusipes, P. dehaani* and *Eriocheir japonicus* were second intermediaries. These facts were confirmed by YOSHIDA, working in Japan during the same year. That the crab might be a carrier of other cercariae was pointed out by YOKOGAWA (1917) and NAKAGAWA (1918). In 1919 NAKAGAWA recognized that the forms, described and illustrated by him in the *Journal of Experimental Medicine* as stages in the development of Paragonimus, were the young stages of *Stephanolecithus parvus*. In the *Journal of Parasitology*, Vol. 6, he replaces his earlier figures and description by new matter.

Writing in 1920 R. ANDO gives an account of attempts to infect experimentally crabs with one of the fifteen cercariae which infest the Melanias in districts where Paragonimus is endemic. That infection of man necessarily depends upon the consumption of uncooked crab or crayfish is controverted by several writers. YOSHIDA in 1916 pointed out that the cercariae migrate through the tissues of the crabs and may be discharged into water from the gills. YOKOGAWA and SUZEMORI (1920) have shown that free larvae cannot penetrate the skin but can enter through the mucous membranes or through wounds and survive.

In some regions the degree of infection is extraordinarily high. KAKAMI (1916) states that in some villages in Korea it attains 82 per cent. in man, 48 per cent. in the dogs and 1–2 per cent. in the pigs.

Although Paragonimus is eminently an infection of the Far East, recent research has disclosed the parasite in Peru (ARCE, 1915) and Yucatan (LARA, 1913), while in Venezuela a high percentage of dogs harbour the parasite, although there it has not yet been recorded from man. In the United States the parasite is sporadic in pigs. WARD has attempted to differentiate three species, *P. ringeri, P. westermanii* and *P. kellicotti*, but KOBAYASHI (1917) does not admit the validity of the specific characters. ODHNER has made a valuable study of the relationships of the lung fluke with allied forms and has placed it with these in a new family, *Troglotremidae*.

Various forms of treatment have been tried with little success. X-rays and radium have no effect (NAKAGAWA, 1916) but ANDO (1917) believes that emetine had some good results, lessening the sexual activity of the worms although it failed to dislodge them. KIKUIKO and IMAMURA report similarly. ANDO has applied the complement fixation test successfully to the diagnosis of infection, while ANTO and YAMATA (1916) find that severe lung involvement is readily distinguished by X-rays, but that the detection of light infections is more difficult owing to the resemblance of the picture to that obtained in cases of tubercle.

The control of the disease may be effected by eradicating either the molluscan or crustacean intermediaries. Attempts have been made to deal with the former by collecting the adult snails.

Clonorchis sinensis.

Like *Paragonimus westermanii*, *Clonorchis sinensis* requires two intermediary hosts. The essential metamorphosis takes place in a mollusc, but the cercaria in the case of Clonorchis encysts in fresh-water fish. KOBAYASHI in 1912 discovered this first link in the chain of infection by feeding cats with the flesh of *Pseudorasbora parva* and *Leucogobio guntheri* in which encysted cercariae occurred naturally in large numbers. In 1915 he extended the list of cercaria-carrying edible fishes to twelve species, and in a later paper (1917) gave reasons, based upon an examination of the worms obtained by experimental infections, for rejecting the differentiation of *Clonorchis endemicus* as a distinct species from *C. sinensis.* He also expressed the opinion that the first intermediary would prove to be one of the species of Melania, probably *M. libertina.* This surmise, however, has been proved to be incorrect, for in 1918 MUTO implicated *Bythinia striatula* var. *japonica.* The high degree of infestation in Chinese is illustrated by the statistics published by GUNN (1916), showing that over 20 per cent. of the Chinese arriving at San Francisco were infected. MAYER (1916) found similarly an incidence of 41·9 per cent. in the Chinese crews arriving at Hamburg. In MAYER's cases there were no clinical symptoms. LEIPER has pointed out that the statistics of Clonorchis incidence may require drastic revision owing to the similarity of the egg of this parasite to those of Heterophyes and Metagonimus, which are likewise frequent parasites in the Chinese and Japanese. Cases occur in which symptoms develop resembling beriberi with ascites, and in one such case recorded by SAMBUC and BEAUJEAN (1913) no less than 21,000 were present, weighing approximately 300 gm. Clonorchis and its allies live in the bile ducts, but two cases are reported by SAMBUC (1911, 1913) in which there was an invasion of the pancreatic duct and its branches.

A detailed study of the clinical and pathological features of this infection has been made by MEBIUS (1920).

Opisthorchis felineus.

CIUREA (1917) considers that ASKANAZY was in error in the experiments which he did in 1905 on the transmission of *O. felineus.* The larval forms with which ASKANAZY was working were apparently Holostomes. CIUREA has isolated the encysted cercariae from *Tinca tinca* and *Idus idus.* They attain adult form in dogs or cats twelve days after feeding.

Fasciolopsis buski.

Discussion still continues on the number of species of Fasciolopsis found in man, the tendency being to reduce the various forms to the single species, *F. buski.* BROWN (1917), working on a large amount of material, divides these parasites into two groups, one tallying with the accepted descriptions of *F. buski,* the other corresponding closely to WARD's description of *F. rathouisi* except for the fact that spines are present. For this latter group he unnecessarily creates a new specific name, *F. spinifera.* GODDARD (1919) gives an interesting account of the clinical conditions resulting from varying degrees of infestation. The association of anaemia and chronic diarrhoea in Shaohsing is pathognomonic of Fasciolopsis infestation. In the final stages the most prominent and distressing symptom is the oedema. The life-history has been traced in Formosa by NAKAGAWA (1921). The intermediate host is *Planorbis coenosus* or *Segmentina largillierti* and the development and later encystment are very similar to that of *Fasciola hepatica,* to which Fasciolopsis is nearly related. Pigs and dogs were experimentally infected with encysted cercariae.

Fasciola hepatica.

The life-history of *Fasciola hepatica* was worked out in essentials by THOMAS in 1881. He showed that after development in *Limnea truncatula* the cercaria encysted upon grass. In 1914 SSININTZIN showed that the cercaria frequently encyst free in water and may thus be taken into the body by drinking. The same observer also demonstrated that the freed cercariae migrate to the liver, not *via* the bile duct, but by penetrating first the intestinal wall and then invading the surface of the liver from the peritoneal cavity.

Several additional cases of accidental infection of man have been reported from France. ROMERO SIERRA (1918) records a case in Venezuela. ITURBE and GONZALEZ (1919) consider that *Ampullaria luteostoma* is the intermediate host in Venezuela, while in the United States BOYD (1920) suspects *Physa fontinalis*. In South Africa Dr. Annie PORTER has infected animals experimentally from *Isidora tropica* and *Limnaea natalensis*.

In an interesting study of the bionomics of *Limnaea truncatula*, WALTON has shown that this mollusc may occur not only in low marshy ground but also in the gutters and ditches on mountain roads.

Echinostomidae.

Five new cases of infection with the rare fluke *Echinostoma ilocanum* are reported by HILARIO and WHARTON from the Philippines (1917). A new genus, *Artyfechinostomum*, is made by LANE (1915) for a species termed *A. sufrartyfex*, based upon sixty-three flukes passed by a girl of eight in Assam. LANE (1917) does not consider that this parasite is the same as the *Echinostoma malayanum*.

Dicrocoelium lanceatum.

There are few records in literature of the occurrence in man of this parasite of sheep. MESNIL, in a verbal commentary on a paper by DE LAVERGNE (1916), stated that recently he had seen the eggs of this fluke in the stools of a Belgian officer who had spent a considerable time in the Congo and later in German East Africa.

Heterophyes heterophyes.

Relatively little work has been done on this parasite, which has been known since the time of BILHARZ to be of common occurrence in Egypt. During the war O'CONNOR recorded two cases in British troops stationed in Egypt. In 1913 LEIPER drew attention to the frequency of this parasite in Chinese and Japanese crews entering the Port of London. Recently CORT (1921) has drawn attention to a description of a new species of *Heterophyes* named *nocens* and described in Japanese in 1915 by ONJI and NISHIO. [A re-examination of material from the Chinese and Japanese cases with specimens collected in Egypt does not reveal any constant specific differences.]

ONJI and NISHIO find that infection is acquired from raw fish, especially of the species *Mugil cephalus*. Reference should be made to the invaluable discussion of the systematic position of the genus *Heterophyes* by RANSOM in 1920.

Loxotrema ovatum.

In 1913 YOKOGAWA found a frequent but apparently innocuous parasite in the small intestine of man in Formosa, Japan and Korea. LEIPER and ATKINSON found it to be common in dogs in Shanghai

(1915). This parasite was first named *Heterophyes yokogawai* by KATSURADA, but was later transferred to a new genus (1913) named by KATSURADA *Metagonimus* and by LEIPER *Yokogawa*. It would appear, however, to be the same as that named in 1908 by KOBAYASHI as *Loxotrema ovatum* and found by him experimentally after feeding animals upon fish containing encysted cercariae. YOKOGAWA found the cercarial stages chiefly in the fish *Plecoglossus altivelis*, seldom in Crassius or Cyprinus in Formosa. MUTO (1917) described as the developmental stages a redia and cercaria found in up to 50 per cent. of *Melania libertina* in the endemic region of Kaishu in Korea, and successfully infected gold fish and carp, later infecting cats from these.

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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

PLAGUE.

HAYDON (L. G.). **Sporadic Outbreaks of Plague in the Union of South Africa.**—*Lancet.* 1921. Nov. 26. pp. 1103–1104.

This is a short paper of considerable interest. The author, who is Assistant Health Officer for the Union of South Africa, notes that the occurrences since 1916 have differed in character from epidemics previously reported in the following particulars :—

" (1) The outbreaks were confined to persons or small groups of persons living in rural areas less densely populated than the bulk of South Africa, and remote from larger towns and villages.

" (2) Investigation and the closest inquiries failed to elicit the existence of ' domestic ' rodents at or anywhere near the scene of the outbreaks. The nature and structure of the farm-houses and native huts in which many of the cases lived was such as not to favour the existence of domestic rodents.

" (3) The time intervals between adjacent groups of cases was irregular, being in some instances a few weeks, and in other instances as much as many months. The distances between the scene of such outbreaks as would at first sight appear to have a common source of infection were in some instances as great as 50 miles, the intervening population remaining unaffected and the closest investigation failing to elicit any connexion, personal or through verminous fomites, between the groups of cases. Many of the cases occurred in persons living on isolated farms of several thousand acres, and having limited intercourse with their neighbours."

The Central Health Department failing to find any source of infection or means of transference of infection from one group to another, Dr. MITCHELL, Secretary for Public Health, decided to have investigation made into the species, habits and morbidity (if any) of the wild rodents of the affected areas. The results of this inquiry were, in the early months of 1921 :—

" The area of country involved, with a radius of about 150 miles, may be roughly described as flat or gently undulating plains intersected by watercourses which only contain flowing water for a few months of the year, but in the valleys of which occasional pools may remain longer. These valleys are fringed with low scrub and vegetation, varying from a few to several hundred yards in width. The soil generally is a light sandy loam. The indigenous vegetation is grass, patches of low scrub, wild melons and cucumbers and the like, which usually grow in such latitudes in plains with scanty rainfall. The area is divided into farms of from 1,000 to 5,000 acres, and is mostly concerned with the raising of sheep and the production of maize and other cereals. The human population, both white and native, is very sparse and widely separated. The conditions generally favour the existence of the smaller wild animals, especially rodents, which find harbourage by burrowing under the roots of grass and the low scrub."

The animals captured were :—

Common Name.	Name as determined by an official of the Transvaal Government Museum.
Gerbille or gerbil	*Tatera lobengulae.*
Large-eared mouse	*Malacothrix typicus.*
Fat mouse	*Steatomys pentonyx.*
White-tailed mouse	*Mystromys albicaudatus.*
Tree mouse	*Dendromys melanotis.*
Dwarf mouse	*Leggada deserti.*
Striped field mouse	*Rhabdomys pumilio.*
Multimammate mouse	*Rattus coucha.*
Namaqua rat	*Rattus namaquensis.*
Golden rat	*Rattus chrysophilus.*
Ground squirrel or meer cat	*Geosciurus capensis.*
Spring hare	*Pedetes caffer.*
Yellow hare	*Lepus ochropus.*
Kolhaas	*Lepus zuluensis.*
Red hare	Pronolagus.
Suricate	Suricatta.
Slender mongoose	*Galerella caaui.*
Yellow mongoose	*Cynictis penicillata.*
Muishond	*Ictonyx striatus.*

Out of this number the gerbille and the multimammate mouse proved to be plague-infected, and showed a very heavy mortality over a wide area. Both are strictly nocturnal; neither lives in farmhouses or huts, but the mouse has been found in farmyards and is considered to be the conveyer of plague.

J. H. Tull Walsh.

Leger (Marcel) & Baury (A.). **La musaraigne** *Crocidura stampflii* **et la peste au Sénégal.**—*C.R. Acad. Sci.* 1922. Feb. 6. Vol. 174. No. 6. pp. 423–426.

During the Dakar epidemic it was thought that the shrew undoubtedly "played a part different to that of the rodents but not without importance." It inhabits native huts, and, although insectivorous, will eat other food found in houses. Between the end of September and the end of December, 1921, the authors examined 861 rats and 267 shrews captured in Dakar town. Among the rodents *B. pestis* was found 93 times, or 10·8 per cent.; among the shrews it formed 9·37 per cent., and upon Crocidura *X. cheopis* is most commonly found. In India *C. cerulea* did not suffer from plague and resisted inoculation with *B. pestis.* In Dacca (Bengal) *X. cheopis* was found on shrews but rarely. Kerandel [this *Bulletin,* Vol. 5, p. 394] writes that in Cambodia *C. murina* "constitutes a reservoir of virus of plague." *X. cheopis* was found on this species. [Although shrews do not actually die of plague during an epizootic outbreak among rodents, infected fleas would leave dead rats or mice for shrews living in the same houses.] Cadet confirms Kerandel for S. Annam. Shrews consorting with rodents should therefore be destroyed.

J. H. T. W.

i. Teppaz (L.). **La peste murine à Dakar en 1921 (juillet-août-septembre).**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 514–516.

ii. Noc (F.). **Au sujet de la peste murine à Dakar.**—*Ibid.* pp. 516–519.

i. Dr. Teppaz begins his paper with a quotation from Roux and Yersin :—" Plague which is at first a disease of rats soon becomes a disease of man." Upon this text his work was based, and with the help of M. BAURY the author studied the rat epizootic during the epidemic. Working in the Institute of Biology, Dakar, they received from the Municipal Sanitary Corps, daily, a varying number of rats, mice and shrews, living or dead. Dead animals were examined at once; living rats, etc., were isolated. After 10 days rats, mice and shrews which still remained alive were killed and examined. During July 240 dead rodents showed 89 suffering from plague; 328 rodents killed after observation showed only 28 cases of infection. In the same month 598 cases of human plague were reported, with 438 deaths. The figures for August and September were:—(1) 362 dead rodents, with 115 suffering from plague; (2) 34 living, of which only 3 were infected, and (3) 519 of both classes, with 10 infected. During August there were 261 cases of human plague with 191 deaths; in September the figures for human plague show the same dimunition as is seen in the rat plague—39 cases, with 25 deaths.

ii. Dr. Noc's paper is a commentary on Dr. TEPPAZ's work, and recalls similar examinations of rodents in 1914, 1919 and 1920. He notes that the flea most commonly found was *X. cheopis*, and on one occasion *Pulex irritans*.

J. H. T. W.

RIGOLLET. **Note sur la peste à Dakar en 1921.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 627–630.

The author contrasts the mortality among cases treated in a hospital and those seen or treated in their own homes: 39 per cent. for the former and 88·8 per cent. for the latter. He points out that among the troops, most of them protected by anti-plague vaccination, the death-rate was only half that which occurred among the unvaccinated civil population.

J. H. T. W.

MORA (A. Damas). **Apontamentos sôbre a epidemia da peste bubónica em Loanda (Fevereiro a Junho de 1921).**—*Rev. Méd. de Angola.* 1921. Aug. No. 1. pp. 11–153. With 3 plates and 3 charts.

This is a detailed account in two parts. Part I deals with history and laboratory diagnosis, epidemiology and sanitary prophylaxis. Plates show structure of flea and method by which the plague bacillus is conveyed from rat to man. Part II contains (pp. 103–153) statistics and clinical notes of the Loanda epidemic. The 65 cases are arranged in four groups, but diagnosis was only confirmed by bacteriology in series 3 and 4. The cases were generally of a mild type. Death-rate 38·5 per cent. It is recorded that plague patients were found to have bacilli in the nails (*v.* p. 119); fragments of nail placed in broth gave a culture of *B. pestis* after 48 hours.

J. H. T. W.

BAKER (C. J.). **Plague. The Kampala Epidemic of 1920.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1920.* pp. 64–66.

The author, during the period upon which he reports, was Acting Medical Officer of Health in Kampala. Human plague was first noticed in the bazaar on December 24, 1919, and in that month there were four cases. Disease among rats had occurred at Port Bell during the previous October, infection being traced to plague stricken rats on one of the lake steamers carrying hides. From Port Bell it reached Kampala. During January, February and March there were 57 cases, all among natives living in the bazaar. The usual sanitary and quarantine measures were instituted; but Dr. Baker writes:—"Towards the middle of March I came to the conclusion that the guards and barriers were doing very little good as the natives had found means of avoiding them, and as they seriously affected the trade of the town they were the cause of much discontent." Co-operation was sought and lectures given to Europeans and to about 100 Indian Merchants. A committee of Indians was formed and personal effects and houses were disinfected. The epidemic ceased about March 18. Meanwhile the epizootic among rats had spread to the Namirembe Market, two miles away. Though "none of the Indians contracted plague (most of them had been inoculated in December and January, as well as in April), some of their native employees were stricken, and the disease spread to an alarming extent in the neighbouring native dwellings—chiefly in Rubaga, Mengo and Namirembe hills." . . . . . "The plague quickly died out where rat driving was vigorously conducted": but remained active within an area of five miles from Kampala until the end of 1920. 10,517 rats were killed within the township and 10,322 were sent in from outside. 13,992 inoculations with anti-plague vaccine (Haffkine's) were made, mostly in January, April and May. Of the fatal cases 53 had received the vaccine. Of 300 cases in 1920, 175 were bubonic, 32 pneumonic and 93 septicaemic. Of these 26 recovered—all bubonic. Plague serum was not used in treatment; but the author gives the results which followed the use of iodine, eusol and carbolic acid in the few cases treated.

J. H. T. W.

BARTHÉLEMY (Prosper). **La peste à bord du "Cronstadt" en rade de Bizerte au mois de juillet 1921.**—*Bull. Acad. Méd.* 1921. Dec. 6. Vol. 86. 3rd Ser. No. 40. pp. 326–328.

The "Cronstadt" formed part of the Russian Black Sea fleet and arrived at Bizerte early in January. There had been cases of typhus and recurrent fever on board and the ship was disinfected with sulphur by the "Clayton" method. From January to June the ship remained at Bizerte and had a clean bill of health. The source of infection was not evident when plague broke out on the 2nd of July, four cases occurring on that day. There were in all 19 cases, with seven deaths. On reflexion the source of infection was thought to be rats which had escaped destruction during the fumigation and were hiding in some sacks of spoiled wheat in a special hold not opened until the end of June.

J. H. T. W.

GOBERT (E.). **La peste dans le sud tunisien en 1920–1921.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 440–446.

Records three outbreaks of plague, which spread from east to west, starting in July, 1920, in the plantations of Ben Gardena. The rodents implicated were field rats and gerbilles (*cf.* HAYDON, *supra*, p. 366). Rodents made their appearance in large numbers on cultivated areas, destroying grain, figs and dates and even attacking the olives. The author writes that the "exceptional pullulation of these rodents constituted a veritable calamity for the region; from one rat-hole alone 5 litres of ears of corn were taken." Plague cases were isolated;

contacts were isolated and vaccinated. The neighbouring population was vaccinated. Antiplague serum was reported, by the medical officers of the various regions affected, to be distinctly useful in the treatment of plague cases. Of the value of antiplague vaccination the following bears witness :—" I had 100 per cent. mortality among the unvaccinated and among those who received serum too late. Among sixteen patients, some vaccinated and others treated at once with serum, there was only one death." (Dr. Campaignolle, at Zargis).

J. H. T. W.

i. de Goyon (J.). **L'épidémie de peste à Tamatave de février à avril 1921.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 602–609. With 1 text fig.

ii. Gouzien (P.). **A propos de la peste de Madagascar.**—*Ibid.* pp. 610–621.

i. Dr. de Goyon's paper records an outbreak of bubonic plague distinctly related to previous disease among rats. There were 107 cases with 71 deaths. The clinical forms observed were :—

(1) Bubonic	(*a*) inguinal	48
	(*b*) axillary	25
	(*c*) cervical	9
(2) Septicaemic	.. ..	6
(3) Bubonic with pulmonary complications		2

Tamatave is exposed to infection owing to its position and its constant intercourse with ships from East Africa and from the Suez Canal.

ii. Dr. Gouzien remarks that his paper forms a sequel to that of Dr. Goyon, since it records an epidemic of pneumonic plague which was traceable to the bubonic cases.

J. H. T. W.

Allain. **L'épidémie de peste de Tamatave en mars et avril 1921.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. July–Aug.–Sept. Vol. 19. No. 3. pp. 247–263.

The same outbreak as noticed under Goyon. Dr. Allain is Inspector of Colonial troops and his report is a detailed résumé of work done by other medical officers. He draws attention to the satisfactory results which followed the treatment by large injections (intravenous) of antiplague serum, and he considers that the 60 per cent. death-rate would have been much reduced if cases could have been seen and thus treated before the patient's condition became desperate. An antiplague vaccine made in Paris was used for prophylaxis. The vaccine prepared at the Pasteur Institute at Antananarivo was also used: Dr. Allain believes that the local Pasteur Institute should keep always ready 1,000 flasks of liquid antiplague serum, 2,000 flasks of dried serum and 500 flasks of antiplague vaccine.

J. H. T. W.

Allain. **L'épidémie de peste pulmonaire de Tananarive (juin-juillet 1921).**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Oct.–Nov.–Dec. Vol. 19. No. 4. pp. 379–418.

The Medical Inspector of Colonial Troops describes the cases of pneumonic plague during an epidemic which began in Tamatave in the usual way with rat-plague and bubonic plague among human beings :—" Towards the end of the month of June, 1921, a native reported to the administration that an abnormal mortality had occurred in two families . . . . one after the other succumbed to a disease which was like a foudroyant pneumonia." Dr. BLIN was directed, as Director of the Municipal Hygiene Department, to enquire as to the cause of these deaths. The native doctors stated that the persons died of a virulent kind of pneumonia, a disease common at that time of year (the coldest season). Even poison was suggested, but a woman accused was able to prove her complete innocence. The two families met at a wedding which lasted from the June 15 to June 20, and it was from the latter date that the deaths began. On June 29 two persons, man and wife, died on the way to the Ankadinandriana hospital. A post-mortem examination was made the same day. Smears from the spleens in each case showed plague bacilli in enormous numbers. A young woman and her brother died with the same symptoms on June 30, and other cases of a similarly sudden nature occurred during July. Dr. Allain believes that the virus came from Tamatave ; but he failed to discover the route and vehicle of infection. There was no epizootic in Tananarive. There were in all 46 deaths between June 24 and July 22, a mortality of 100 per cent. In most of these cases no treatment was possible, but one person who lived for three days received 300 cc. of antiplague serum intravenously : Dr. Allain remarks that much larger doses should be given. The usual sanitary precautions were taken to prevent spreading of the infection, and vaccination was made compulsory by an order from the Governor General dated July 22. The town was declared free from plague on August 7. No European was attacked.

J. H. T. W.

GARNIER. **Le choléra et la peste en Indo-Chine pendant les années 1919 et 1920.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Oct.-Nov.-Dec. Vol. 19. No. 4. pp. 418-423.

The chief facts concerning plague are summarized in Table II given below :—

Name of Colony.	1919.						1920.					
	Cases.		Deaths.		Vaccinations.	Number of rats destroyed.	Cases.		Deaths.		Vaccinations.	Number of rats destroyed.
	Europeans.	Natives.	Europeans.	Natives.			Europeans.	Natives.	Europeans.	Natives.		
Tonkin	..	..	..	..	..	..	..	2	..	1	..	..
Annam	..	196	..	..	19,015	16,512	..	266	..	227	33,562	19,414
Cochin China ..	1	194	1	140*	12,712	..	..	102	..	71	6,126	1,273
Cambodia	..	74	..	114*	4,262	65,991	..	249	..	242	14,234	80,957
Laos	..	..	..	72*	..	..	..	..	..	..	..	..
Territory of Kouang-Tcheou-Wan ..	..	378	..	378	..	..	..	30	..	29	..	..
Totals ..	1	842	1	704	35,989	82,503	..	649	..	570	53,922	101,644

* These figures are reproduced as in the original, but apparently need moving up one space to adjust the table.

Plague is said to be endemic in Annam and Cochin China. The forms observed were bubonic and septicaemic plague. There is, however, a noticeable diminution in the number of plague cases, which happy result is ascribed to rigorous application of preventive measures carried out by the local authorities. Houses not capable of sanitary disinfection are destroyed, the owners receiving compensation. Notification of cases is compulsory and the patients are isolated and treated in special hospitals.

J. H. T. W.

i. WU LIEN TEH. **Second Pneumonic Plague Epidemic in Manchuria, 1920–1921.**—*Nat. Med. Jl. China.* 1921. Sept. Vol. 7. No. 3. pp. 98–121.

ii. ——. **Plague in the Orient with Special Reference to the Manchurian Outbreaks. An Address delivered at the opening of the Union Medical College, Peking, September 16th, 1921.**—*Ibid.* Dec. No. 4. pp. 178–201. With 4 text figs.

i. Article No. 1 consists of brief bulletins notifying the appearance of bubonic plague at Hailar, November 26, 1920; followed by cases of septicaemic and pneumonic plague in January, 1921. Other outbreaks occurred in various parts of Manchuria. At Tehchow, in Shantung, 90 deaths occurred from pneumonic plague. It is not easy nor is it necessary to give the statistics, and the sanitary and precautionary measures were those usually adopted.

ii. The author writes that :—" Whether Dr. W. J. SIMPSON be right or wrong in naming China's south-western province of Yunnan " as the primary focus of plague infection, " there is no doubt that since the great pandemic of 1894 the endemic areas have increased both in number and extent." He then gives a useful " table " showing the death-rate in various parts of the Orient.

Location.	Years.	Year of severest infection.	Total Plague Deaths.	Aggregate Population.
India	1896–1917	1907	9,841,396	320,000,000
Ceylon	1914–1917	1914	978	800,000
Straits Settlements ..	1910–1917	1917	280	1,000,000
Dutch East Indies ..	1911–1917	1917	34,732	40,000,000
Siam	1911–1917	1916	1,063	9,000,000
Indo-China (French) ..	1911–1917	1913	14,911	18,000,000
Hong Kong	1895–1917	1914	15,731	520,000
Japan	1907–1916	1907	1,380	50,000,000
Formosa (Japan) ..	1896–1917	1901	24,108	3,400,000

Except for Shanghai and Manchuria, the former controlled by an efficient Health Department of the International Municipal Council, the latter by the Manchurian Plague Prevention Service, statistics are difficult to obtain. The Manchurian outbreaks are then briefly reviewed and a " table " is given showing: locality, type of plague and mortality from 1910 to August, 1921. The greatest epidemics occurred in 1910–11, 1917–18, and 1920–21, when 60,000, 16,000 and 9,000 persons died. Dr. Wu was responsible for the management of the first and third epidemics. The first found China absolutely unprepared, but funds were obtained and by April, 1911, plague had been stamped out from Harbin, southwards to Shantung. The Manchurian Plague Prevention Service had been established for nine years when the 1920–21 epidemic appeared; the value of its work is shown in the reduced mortality. The photographs show a group of marmots (Tarabagan) *Arctomys bobac*; patients with pneumonic plague and doctors, protected by masks, performing experiments on marmots. The tarabagan and also the smaller marmot, *Spermophilus citellus*, easily succomb to pneumonic plague produced by inhalation of *B. pestis* in spray.

J. H. T. W.

WASILEWSKI (A.). **Epidemja dzumy plucnej na Dalekim Wschodzie w 1921 r.—Epidémie de la peste pulmonaire en Extrême Orient en 1921.**—*Przegl. Epidemjol.* Warsaw. 1921. Vol. 1. No. 6. pp. 638–645. With 3 charts in text. [French summary, p. 645.]

This epidemic occurred in the Trans-Baikal region of Eastern Siberia. Hunters of marmots, living on the steppes, were the first victims. Such epidemics last generally for 12 to 13 weeks. Two forms of plague, pulmonary and bubonic, are produced by the same infection. The author believes, contrary to other opinion, that antiplague vaccination has no influence upon pulmonary plague.

[Pneumonic cases are usually more severe than bubonic and more vaccinated persons would probably die of pulmonary plague than of the milder bubonic form. Nothing is said as to the use of antiplague serum for treatment.]

J. H. T. W.

HYLKEMA (B.). **De rattenvlootheorie en de pest in Europa.** [The Rat Flea Theory and the Plague in Europe.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. Pt. 1. No. 4. pp. 375–392. With 1 curve.

The author advocates the probability of the human flea playing an important part in the spreading of plague under European circumstances. He criticizes the rat-flea-man theory, and thinks that the connection between rat plague and human plague is not at all an immediate one. The curve of rat plague preceding that of human plague in Bombay, f.i., has been obtained by comparing the number of rat corpses found with the number of rats caught in traps, etc., figures dependent upon different factors. If, however, the percentage of plague rats among the total number caught is marked in the curve the lines of rat plague and human plague show a striking parallelism, suggesting that the disease in both species may be brought on by the same factor. This factor is the rat flea, the transfer of which over longer distances with goods and in the vicinity by its own motility explains as well the plague spreading per saltum as that per contiguity. In the flea the plague virus may remain active for a long time, which is possible neither in man nor in rats. This persistence in the flea may account for the seasonal recurrence of plague epidemics (Bombay and, in former centuries, Europe).

In Europe, especially in the recent plague epidemic in Paris, the connection between rat plague and human plague remained uncertain. No rat plague has been shown with certainty, and on the other hand probable transfer of human plague by people watching the corpses of plague sufferers has been observed. In the class of people among which plague occurred fleas are very common. The author quotes other European plague epidemics of the later years in which no connection with rat plague could be detected. Possibly the infection has been brought over in these epidemics by human fleas from ships.

In former centuries the hygienic circumstances in Europe made fleas more prevalent than nowadays and this way of transmission of plague in the serious epidemics of those days may have been the usual one, especially as no connection with rat plague was observed then.

In the natives of the tropics, with their thin clothing and greater bodily cleanliness, human fleas are rare. The views on the spreading of plague in Europe have been too largely influenced by experience in the tropics.

W. J. Bais.

DE ARAUJO (Eduardo). **Determinações cutaneas da peste. Estatistica, aspecto clinico e pathogenia.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Ser. Nos. 5 & 6. pp. 105–109.

An account of 60 cases of plague presenting cutaneous manifestations. The following classification of cases with their end-results is given by the author :—

	Total.	*Recovered.*	*Died.*
Vesico-pustules	36	8	28
Carbuncles	13	9	4
Inflammatory patches ..	2	0	2
Pustules and Carbuncles	7	2	5
Pustules and inflammatory patches	2	0	2
	60	19	41

Of these cutaneous lesions the most frequently occurring form was the vesico-pustular, in which the forms macule, papule, vesicle and pustule are rapidly passed through in succession. The chief feature of the eruption is its irregularity of development, all the various stages, up to cicatrization, being exhibited by the same patient. Large numbers of the pustules undergo complete cicatrization, leaving little or no trace behind. The death-rate in this form is high, the patients passing into a condition of profound adynamia which proves fatal in a few days. In this, as in the other forms, the plague bacillus is uniformly present in the lesions. In discussing the pathogenesis of these cutaneous manifestations of plague the author maintains that they are not an expression of plague septicaemia. Examination of the blood for the bacillus gave a uniformly negative result, and, in the author's opinion, the causal organism reaches the skin by way of the lymphatics, the cutaneous infection being secondary to that of the glands. In some of the cases under treatment by the author at the Bahia Isolation Hospital, Dr. Leoncio PINTO has demonstrated the existence of the plague bacillus in the cutaneous lymph channels.

F. S. Arnold.

HARTMAN (Henry) & BOWIE (Anna). **Postmortem Findings in Twelve Cases of Plague.**—*Jl. Amer. Med. Assoc.* 1922. Feb. 18. Vol. 78. No. 7. pp. 493–497. With 4 text figs.

In this paper the authors summarize the pathological conditions found in eleven cases of bubonic and one case of pneumonic plague. The deaths occurred during an epidemic in and around Galveston [see this *Bulletin*, Vol. 17, p. 389 (LEVY & MCMICKEN), also p. 394 (LEVY); Vol. 18, p. 349 (BOYD & KEMMERER)]. The results of the post-mortem examinations are given in a table.

DELAMARE (Gabriel). **Oedème pesteux primitif aigu.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 94–98.

The author records the appearance of acute oedema widely diffused on the second day in a fatal case of plague. The only other visceral lesion was a small area of congestion at the base of the right lung. This spontaneous oedema in a human case resembles that which occurs in experimental inoculations when very virulent cultures are injected subcutaneously. This was evidently a virulent plague septicaemia. *B. pestis* was isolated from the sanguineous serum of the oedematous area and with it was also found *Streptococcus conglomeratus* which was not pathogenic for rabbits.

J. H. T. W.

KLING (C.) & HESSER (S.). **Om Pestbacillagglutination.** [The Agglutination of the Plague Bacillus.]—*Hygiea.* 1921. Vol. 83. No. 19. p. 625.

Three strains of the plague bacillus obtained from the Gesundheitsamt, Berlin, were morphologically and culturally normal but they had lost their virulence and were not agglutinated by some agglutinating serum obtained from Bern in a dilution of 1 in 10. [Normal serum agglutinates in lower dilutions.] Similar experiences were obtained with agglutinating sera from the Pasteur Institute and also from Dresden. The authors then proceeded to make some agglutinin of their own in rabbits instead of horses, as it is known the latter animals are especially liable to give sera which have very limited group agglutinability among the various strains. This they succeeded in doing by injecting plague bacilli killed at 60° C., into rabbits. The serum had a titre of about 1 : 6,000 and was made with a Pasteur Institute strain of plague bacillus. It agglutinated four other strains besides the homologous. They then passed the "Pasteur" strain through a guinea-pig and obtained the rather surprising result that it lost its agglutinability. This, however, returned after about nine subcultures on artificial media, but it was not so easily agglutinated as the original culture.

Two strains of plague bacilli were isolated from two rats which died in the same epizootic on a ship coming from Rio de Janeiro. One was agglutinated by the high titre serum but the other not at all.

All these observations go to show that the fact that a bacillus is not agglutinated by a specific agglutinating serum does not exclude its being the plague bacillus. [The same thing occurs with atypical cholera vibrios, etc.—J. H. T. W.]

E. E. Atkin.

EPSTEIN (Emil). **Ueber die Darstellbarkeit polgefärbter (pestbazillenähnlicher) Stäbchen bei verschiedenen Bakterienarten. Die Polfärbbarkeit als vitall, durch Bakterienwachstum in wasserreichen Nährmedien bedingte Erscheinung.** [Polar Staining of Bacilli allied to *B. pestis*.]—*Arch. f. Hyg.* 1921. Vol. 90. No. 4. pp. 136–154. With 1 plate.

Records the finding that bi-polar staining is not a phenomenon confined to *B. pestis* and the group to which it belongs. Laboratory workers should refer to the original for details and conditions under which this form of staining has been found by the author. The coloured plate shows *B. coli*; fig. 5 from Bouillon culture and fig. 6 from the heart blood of a guinea pig with well-marked and exclusive bi-polar staining. Among other conditions the method of fixing the specimen influences the result. Thus we find on the plate: figs. 8 and 9, showing the same bacillus, stained and fixed by heat, with general staining; whereas it shows bi-polar staining as a "living stain," the body of the rod not being coloured.

J. H. T. W.

i. WHITE (H. F.). **Various Aspects of the Plague Situation in the South.**—*Texas State Jl. Med.* 1921. Oct. Vol. 17. No. 6. pp. 307–309.

ii. JOLTRAIN (E.). & DE GENNES (L.). **Nouveaux cas de peste bubonique avec septicémie observés à Paris.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Dec. 15. Year 37. 3rd Ser. No. 36. pp. 1653–1658.

iii. BINNEY (E. H.). **Reminiscences of the Plague.**—*Med. Jl. Australia.* 1921. Nov. 5. 8th Year. Vol. 2. No. 19. pp. 398–399.

i. This is a paper read before the Section on State Medicine and Public Hygiene, State Medical Association of Texas, Dallas, May 11, 1921. The outbreaks of plague in Texas have already received notice in this *Bulletin* [see Vol. 16, pp. 428, 429, 433: WILLIAMS; HALL; HARRISON; Vol. 17, pp. 387, 389, 394; MCCOY; LEVY & MCMICKEN; LEVY].

ii. The author tells us that up to 1920, no case of plague had been reported in Paris since 1669. He adds, with clinical details, some fresh cases to those noticed in this *Bulletin*, Vol. 17, p. 392 and Vol. 18, p. 348.

iii. Refers to an epidemic which occurred in Sydney 20 years ago. Contains nothing new.

J. H. T. W.

COMBY (J.). **La peste bubonique à Paris.**—*Arch. de Méd. des Enfants.* Paris. 1921. Nov. Vol. 24. No. 11. pp. 681–688.

FILIPPINI (A.). **Le minacce della peste.**—*Policlinico.* Sez. Prat. 1922. Mar. 27. Vol. 29. No. 13. pp. 417–418.

GUINON (L.) & DE PFEFFEL. **Quelques aspects cliniques de la peste chez l'enfant.**—*Arch. de Méd. des Enfants.* Paris. 1921. Nov. Vol. 24. No. 11. pp. 670–675.

SPENCER (R. R.). **A Note on the Natural Immunity of Wild Rats to Plague.**—*Public Health Rep.* 1921. Nov. 18. Vol. 36. No. 46. pp. 2836–2838.

URIARTE (Leopoldo). **Profilaxis de la peste. El problema de las ratas y el carbonato de bario.**—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. May & June. Vol. 27. No. 3. pp. 139–149. With 1 text fig.

CHOLERA.

Garnier. **Le choléra et la peste en Indo-Chine pendant les années 1919 et 1920.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Oct.-Nov.-Dec. Vol. 19. No. 4. pp. 418–423.

The author gives useful information, which is contained in two "tables."

Cholera.

Name of Colony.	1919.					1920.				
	Cases.		Deaths.		Vaccinations.	Cases		Deaths.		Vaccinations.
	Europeans.	Natives.	Europeans.	Natives		Europeans.	Natives.	Europeans	Natives.	
Tonkin	2	1,100	..	654	2,180	..	401	..	263	7,380
Annam	..	328	..	224	19,415	..	141	..	81	5,124
Cochin China	4	3,190	2	2,355	90,000	3	995	1	611	67,580
Cambodia	..	1,227	..	1,005	8,500	..	98	..	74	3,476
Laos	..	507	..	507	1,720	..	..	..	..	..
Territory of Kouang-Tcheou-Wan	..	66	..	53	..	..	..	..	..	..
Totals ..	6	6,418	2	4,798	..	3	1,635	1	1,029	..
					121,815					83,560

The results of anticholera vaccination are regarded as satisfactory and further proof of its value is shown among the troops. They live side by side with the civil population but anticholera vaccination has been compulsory since 1917, with revaccination when cholera becomes epidemic. The death rate in 1919 was 26; in 1920 only two soldiers died of cholera.

J. H. Tull Walsh.

Crawford (Wallace). **Cholera at Tzeliutsing.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 417–419.

Reports an ordinary and apparently mild epidemic of cholera. Saline injections were only required in 61 cases, of which 17 died. The remaining 81 cases were treated with kaolin and Squibb's mixture. Of these 22 died. There were in addition 94 cases of which no particulars as to treatment are given. It is recorded that: "In our hands every opium-smoker was a fatal case." One man found with opium on his person—apparently an opium-eater—recovered.

J. H. T. W.

Nomura (Teiichi), Sotoma (Gencho) & Harada (Shiro). **[On Cholera Epidemic which broke out in Osaka during the Year 1920.]**—*Eiseigaku Densenbyogaku Zasshi.* (*Jl. of Hyg. & Infect. Dis.*). 1921. July. Vol. 16. No. 6. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. p. 20.]

The authors observed 392 cases—261 males and 131 females. There were 77 carriers. Prophylactic vaccination reduced mortality to 1/10 per cent. and morbidity to 7½ per cent. as compared with the non-vaccinated. It also reduced the number of carriers.

J. H. T. W.

SZYFMAN (I.). **Epidemjologja cholery w Brześciu nad Bugiem. Epidémie de choléra à Brest-sur-Boug.**—*Przegl. Epidemjol.* Warsaw. 1921. Vol. 1. No. 6. pp. 646–649. (French summary p. 649.)

The first case, confirmed bacteriologically, occurred on October 13, 1920; the last on January 23, 1921. Total number of cases 121, of which 38 were "carriers," 83 actually suffering from cholera. Most of these patients were prisoners of war. The death-rate was 44·5 per cent.

Anticholera vaccinations and isolation of "carriers" helped to wipe out the epidemic. In view of the possible outbreak of a further epidemic in the following spring the author insisted on maintaining the sanitary measures and on repetition of anticholera vaccination. Suspects were submitted to bacteriological examination. [Methods of treatment are not recorded in the summary.]

J. H. T. W.

KOCH (Jos.). **Bemerkungen zu der Arbeit Sanarellis "De la Pathogénie du Choléra (Premier Mémoire). La défense naturelle du péritoine contre les vibrions."**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–1921. Vol. 91. pp. 195–196.

The author points out that, although SANARELLI mentions the work of certain previous investigators, he has omitted reference to work done on the relation of the great omentum to vibrios and other bacteria by him. Dr. Koch published his paper, in 1911, in Vol. LXIX of the *Zeitschrift*. He agrees with SANARELLI as to the importance of the part played by the omentum [see this *Bulletin*, SANARELLI (G.), Vol. 14, p. 179; and Vol. 16, p. 28].

J. H. T. W.

BAUMGARTEN (W.). **Chemotherapeutische Versuche mit Akridinpräparaten an cholerainfizierten Meerschweinchen und Mäusen.**—[Chemotherapeutic Experiments with Acridine Compounds on Cholera-infected Guinea-pigs and Mice.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920–1921. Vol. 91. pp. 511–537.

The author is an assistant in the "Robert Koch" Institute, Berlin. He states that, with NEUFELD and SCHIEMANN, he has already briefly recorded the action of acridine (trypanflavin) and other allied dyes on germs causing septicaemia; also on experimental infection (intraperitoneal) of guinea-pigs and mice with cholera vibrios. With regard to vibrios, development is checked or they are killed by solutions of 1 in 250,000 to 1 in 300,000. The germs lose their motion and clump. Thus, with injection of vibrios, acridine-nitrate was given to a guinea-pig (200 gm.). A control of the same weight showed numerous active vibrios and the animal died after six days. The first guinea-pig died after 14 days but the vibrios were destroyed. Diamino-acridine nitrate in small doses and trypanflavin both have a curative effect on guinea-pigs and mice infected with cholera vibrios. Tables and full details of the experiments are given.

J. H. T. W.

SANARELLI (G.). **De la pathogénie du choléra. [Cinquième mémoire.] Le "choléra intestinal" des jeunes animaux.**—*Ann. Inst. Pasteur.* 1921. Nov. Vol. 35. No. 11. pp. 745–796.

[For previous memoirs, see references, Vol. 17, p. 401.]

The author finds that very young rabbits are very susceptible to cholera infection. This sensibility, however, does not endure for any length of days. From the tenth day young rabbits, that previously would have died from diarrhoea and collapse, begin to resist infection and tolerate virulent cultures of *V. cholerae* administered in food. For ten days after birth the young rabbits are suckled. At the end of that time they take to a vegetable diet. The author writes :—" Strange coincidence : it is from that moment that they begin to show resistance to cholera infection." Careful investigation has resulted in the following conclusions :—

1. The gastric juices of very young rabbits do not allow the passage through the pylorus of any species of microbe that does not produce spores. The earliest species that reach the intestines are anaerobes. The duodenum is sterile.

2. The cholera vibrio administered, by the mouth, to suckling rabbits produces a fatal morbid condition which has little resemblance to true cholera in man.

3. Vibrios introduced into the buccal cavity of rabbits at the breast disappear rapidly. Bactericidal action of the maternal milk no doubt assists this disappearance.

4. In young that have died of " cholera " even if the infection have been introduced into the blood circulation there is abundant excretion of vibrios by the bucco-pharyngeal mucous membrane.

5. The normal gastric contents of newly-born rabbits have a high acidity. But, contrary to what is observed in adult and in newly-born guinea-pigs, the acidity in suckling rabbits, infected with vibrios, increases with the onset of the intestinal disease.

6. The gastric juice of newborn and adult rabbits exercises an almost immediate bactericidal action on non-sporulating germs.

. . . .

8. In the " cholera " of young rabbits the organs selected by the vibrios are : the caecum and appendix and the colon. The small intestine is always less rich in vibrios if not sterile, which is the rule in the duodenum. Thus we have an entero-colitis and not a true " intestinal cholera."

9. Vibrios introduced into the mouth of the rabbit at the breast do not reach the intestinal walls direct by way of the stomach, but arrive indirectly through general circulation.

10. One may obtain this entero-colitis in newborn rabbits by injecting vibrios under the skin or into the peritoneal cavity.

11. Vibrios given by the mouth to young rabbits are at first absorbed by lymphatics and pass from these by the trunk lymphatics to the general circulation. They first appear in the alimentary canal after about twelve hours and at the level of the ileum, caecum, appendix and colon. Later a few mount into the small intestine but never reach the duodenum.

. . . .

13. The intervention of other microbes, such as *B. coli*, increases the gravity of the intestinal disease and may even start it when they have reached a maturity which would ordinarily render them resistant.

14. Such resistance begins about the tenth day and coincides with the first appearance in the blood plasma of the vibrionicide (alexine).

15. Before that time the blood serum of newborn rabbits is very poor in alexin, which explains failure to procure immunity by means of vaccines.

16. The appearance of specific antibodies in the blood of newborn rabbits can only be obtained by vaccinating the mothers during the period of gestation. Rabbits born of such mothers are resistant even to the entero-colitis.

17. The resistance offered by older rabbits is principally due to a reduced permeability of the buccal mucous membrane and a reduced sensibility of the intestinal mucous membrane by which the vibrios are excreted.

18. This is also the reason why guinea-pigs, even young ones, do not suffer from this "intestinal cholera." Guinea-pigs, with a gestation period of at least 60 days (rabbits 30 days) are provided with much more developed organs of digestion.

19. The gastric acidity of newly born guinea-pigs prevents the passage of vibrios or of other non-sporing germs administered by the mouth.

20. Vibrios given to newborn guinea-pigs by the mouth may, however, if only in small numbers, be absorbed by the lymphatics of the mouth and eliminated as customary by the lower segments of the digestive tube.

J. H. T. W.

OTSUBO (I.). **[A Phenomenon presented by Iodine on the Cultivation of Cholera Vibrio.]**—*Saikingaku Zasshi* (*Jl. of Bact.*). 1921. May. No. 308. [Summarized in *Japan Med. World.* Tokyo. 1921. Sept. 15. Vol. 1. No. 5. p. 27.]

The authors added iodine or lugol solution to the medium on which the vibrio was cultivated. The result was that in a short time there appeared a very beautiful ring round the colonies. This ring did not take the stain of iodine. If left for some time the ring disappeared; but reappeared if fresh iodine was added. This phenomenon was positive with 36 cultures of *V. cholerae* as well as with other vibrios. [May be due to reaction on starch in the medium?—See below, KODAMA.]

J. H. T. W.

KODAMA (Toyojiro) & TAKEDA (Eiichi). **[On a New Biological Reaction of Cholera Vibrio.]**—*Eiseigaku Densenbyogaku Zasshi* (*Jl. of Hyg. & Infect. Dis.*). 1921. Sept. Vol. 17. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. pp. 23–24.]

The authors repeated the experiments of OTSUBO with iodine, introduced into culture media for *V. cholerae*. They think that the reaction is due to the production of saccharine ferments.

J. H. T. W.

GILDEMEISTER (E.). **Ueber Variabilitätserscheinungen bei Vibrionen.** [Variability in Appearance of Vibrios.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 5. Vol. 87. No. 4. pp. 241–254. With 11 text figs.

Without the figures this paper will not convey much information. The variation in the appearance of certain colonies of vibrios is due to the culture medium on which they they are grown and to the length of time of growth. It is a paper which might be of use to a working bacteriologist but is not of much importance to medical workers in general.

J. H. T. W.

IITAYO (Katsusaburo). **[On the Application [Use ?] of Fish Broth for the Demonstration of** *Vibrio cholerae.*]—*Saikingaku Zasshi* (*Jl. of Bact.*). 1921. Aug. No. 311. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. p. 17.]

The author prepared a fish broth by boiling 50·0 gm. of fish in 1 litre of water containing 5·0 gm. of salt. In the medium thus obtained *V. cholerae* grew vigorously; while saprophytes did not grow at all.

J. H. T. W.

KODAMA (Toyojiro). **[On a New Specific Medium for** *Vibrio cholerae.*]—*Eiseigaku Densenbyogaku Zasshi* (*Jl. of Hyg. & Infect. Dis.*). 1921. Sept. Vol. 17. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. p. 24.]

Kodama gives three media based on the colour reaction of *V. cholerae* :—

1. Litmus agar with starch :—

3 per cent. neutral agar with Witte's peptone	100·0 cc.
10 per cent. soda water [sic] ..	2·0 cc.
Starch	3·0 gm.
1/60th Litmus water	15·0 cc.

2. Fuchsin agar with starch :—

As in No. 1 with (in place of litmus)—

Saturated alcoholic solution of Fuchsin	0·1 cc.
20 per cent. sodium sulphite solution	2·5 cc.

3. Fuchsin-cattle-serum-agar :—

Fuchsin agar with starch (as above)	2 parts.
Cattle serum diluted 1·5	1 part.

These are used with the colorimeter.

J. H. T. W.

KRAUS (R.). **Ueber die Verschiedenheit der Eltor- von den Choleravibrionen.** [Difference between El Tor and Cholera Vibrios.] —*Muench. Med. Woch.* 1922. Apr. 7. Vol. 69. No. 14. pp. 499–500.

Records results confirming the haemolytic powers of the " El Tor " vibrio. The author, however, unlike most observers, believes that this strain of vibrios gives rise to a special toxin [compare this *Bulletin*, Vol. 16. p. 40 (KABESHIMA) ; Vol. 18, p. 353 (DOUGLAS)].

J. H. T. W.

BESREDKA (A.). **De la vaccination contre le choléra.**—*Bull. Inst. Pasteur.* 1922. Jan. 15. and Jan. 30. Vol. 20. Nos. 1 and 2. pp. 1–8 ; 41–51.

The author points out that anticholera vaccination has not received the attention to which it is entitled because its protective power is at present of short duration and it cannot fully be demonstrated by laboratory experiments. Those who have worked during cholera epidemics, however, know the value of the vaccine [see this *Bulletin*, Vol. 17, p. 403 (SIERAKOWSKI) ; p. 406 (FURUTAMA & TEAGUE)]. Besredka gives the history of the discovery of *V. cholerae* in 1884 and of FERRAN's unhappy use of a vaccine in 1885, the experiments of HAFFKINE, ROUX & YERSIN by which a fixed virus and a controlling attenuated vaccine were arrived at and notes HAFFKINE's voyage to India in 1903 to make trial of the new vaccine. In all the vaccines above mentioned live vibrios were found. Next came the vaccine of GAMALÉILA in which vibrios had been heated at 120°. This vaccine protected guinea-pigs against living *V. cholerae.* Then followed the anticholera vaccine prepared by BRIEGER, KITASATO and WASSERMANN and exposed to 60° C. for a quarter of an hour. In 1902 sensitized vaccines were announced as conferring protection on animals. From that year to 1918 there was no advance, but in 1918 SHIGA, TAKANO and S. IABE reported that antibodies appeared more rapidly when a sensitized vaccine was used. At the request of the author, Dr. MASAKI undertook some experiments with a vaccine containing living sensitized vibrios. He showed that if non-sensitized vibrios, 1/50 of a culture, killed a guinea-pig when injected into the peritoneal cavity it required an entire culture, often more, after the vibrios were sensitized. Moreover, when injection of 2–3 cultures of sensitized vibrios caused the death of a guinea-pig no vibrios could be cultivated from the intestinal contents. Death was due to local peritonitis with, possibly, general shock due to liberation of endo-toxin.

J. H. T. W.

MASAKI (S.). **Du vaccin anticholérique sensibilisé vivant.**—*Ann. Inst. Pasteur.* 1922. Mar. Vol. 36. No. 3. pp. 273–286.

The author refers to the work of BESREDKA, who first suggested the " sensitized " vaccine. He then describes his method of preparing the vaccine used in these experiments on guinea-pigs ; anticholera serum of a titre of 1–6000 is diluted by one fourth physiological saline solution ; 4 cc. of this diluted serum is added to an agar tube culture of *V. cholerae* 24 hours old. The mixture is :—(1) placed in the incubator at 37° ; (2) left at laboratory temperature 15° to 20°.

1. Sensitization reduces the vitality of the vibrios. Those sown on agar at the end of 24 hours show a vitality diminished by half as compared with the original culture; at the end of 48 hours there is often no growth.

2. At laboratory temperature sub-cultures are positive at the end of 48 hours; but the number of colonies obtained is smaller.

As a test of virulence four vaccines were used:—

i. left in incubator 24 hours.
ii. „ „ 3 „
iii. „ at laboratory temperature 24 hours.
iv. „ „ „ 6 „

A guinea-pig inoculated with one tube of No. iv on May 1 died on May 4; 1·5 tubes produced the same effect, while a guinea-pig inoculated with two tubes of the sensitized No. iv died on May 2.

Guinea-pigs (weight 390–400 gm.) inoculated subcutaneously or intraperitoneally with similar doses of vaccines i, ii and iii survived. Thus is it seen that sensitization reduces the virulence.

Conclusions:—(1) Sensitization with anticholera serum produces weakened vitality in the vibrios, and if the mixture is left too long in the incubator they die. The most favourable temperature is 37°. (2) With the reduced vitality there is of course reduced virulence in the vaccine. (4) This sensitized vaccine confers on the animals a rapid and durable immunity.

J. H. T. W.

MASAKI (S.). **Du mécanisme de l'infection cholérique et de la vaccination contre le choléra par voie buccale.**—*C. R. Soc. Biol.* 1922. Mar. 11. Vol. 86. No. 10. pp. 532–534.

Professor Masaki very rightly points out that the injection of lethal doses of vibrios into the peritoneal cavity or subcutaneously in experiments with guinea-pigs is not following the normal method of infection with cholera virus. Death really occurs from peritonitis or general septicaemia. This can be proved by examination of all organs immediately after death. He gives two examples:—

1. Guinea-pig No. 80, weight 400 gm.:—On March 16, at 6 p.m., it received in the peritoneum 1/40 of an agar culture of vibrios. It died at 5 p.m. on the 17th. Inoculations from the peritoneal fluid, the blood, bile and urine were negative; contents of small intestine gave numerous colonies of *V. cholerae* and very rare colonies of *B. coli*; contents of large intestine gave numerous colonies of *V. cholerae* and of *B. coli*.

2. Guinea-pig No. 95, weight 390 gm.:—Received on March 30 a sub-cutaneous injection of an entire agar culture of cholera vibrios at 8 a.m. It died at 7 p.m. The serum taken from the subcutaneous area gave a pure culture of *V. cholerae*. Blood, bile and peritoneal fluid sterile. Contents of small intestine at different levels gave numerous colonies of *V. cholerae*. Contents of large gut gave numerous colonies sprinkled with colonies of *B. coli*. [This is what one would expect; see this *Bulletin*, Vol. 18, p. 73.]

Living vibrios may be given in enormous numbers by the mouth to rabbits with no untoward results, but if the animals have first been "sensitized" by bile given by the mouth, the author finds that antibodies are formed and animals so sensitized will survive intravenous injection of a lethal dose of living *V. cholerae*. The author concludes that the rabbits have thus been actively vaccinated by way of the mouth, since no trace of immunity or of antibody is found after repeated doses of vibrios living or dead without sensitization.

J. H. T. W.

i. LESAGE (A.). **Le choléra infantile et les mouches. Son isolement en pavillon spécial.**—*Bull. Acad. Méd.* 1921. Nov. 15. Vol. 86. No. 37. pp. 267–268.

ii. OHYAMA (Hishiichi). **[On Saccarification and Red Reaction of** *Vibrio cholerae.*]—*Eiseigaku Densenbyogaku Zasshi* (*Jl. of Hyg. & Infect. Dis.*). 1921. Sept. Vol. 17. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. p. 24.]

iii. WATANABE (Yoshimasa), KAWAI (Jitujin) & WATANABE (Hotori). **[On the Strain of** *Vibrio cholerae* **isolated from the Cases of Cholera occurring during the Epidemic which prevailed in Kanagawa and Tokyo Prefectures in 1921.**]—*Saikingaku Zasshi* (*Jl. of Bact.*). 1921. Aug. No. 311. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. pp. 16–17.]

iv. YAMAMOTO (R.). **[A Therapeutic Experiment of Cholera.**]—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*). 1921. Jan. Vol. 20. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1921. May 15. Vol. 1. No. 1. p. 23.]

v. WATANABE (Yoshimasa), KAWATANI (Makoto) & WATANABE (Hotori). **Ueber die Beziehung der im Jahr 1920 geherrschten Cholerastämme und den El Tor-Vibrionen.** [Cholera Strains and El Tor Vibrios in Japan during 1920.]—*Kitasato Arch. Experim. Med.* 1921. Vol. 4. No. 3. pp. 281–298.

i. Contains nothing new. Traces infection to flies through food.

ii. The author finds that *V. cholerae* and other vibrios show a more marked colour reaction in culture media containing starch.

iii. Five strains were isolated from carriers in June, 1921. There was nothing abnormal on culture. They resembled those found during the 1920 epidemics [see this *Bulletin*, Vol. 17, p. 406.]

iv. Records the well-known value of bicarbonate of soda with the hypertonic salt solution in severe cases of cholera.

v. The substance of this paper has already been noticed over the signature of Hiroshi OHSHIMA [this *Bulletin*, Vol. 17, pp. 405–406], and also in the Sectional Editor's "Review," Vol. 18, p. 72.

J. H. T. W.

POTTEVIN. **Le diagnostic bactériologique du choléra.**—*Bull. de l'Administration sanitaire des Frontières.* 1921. Dec. 20; & 1922. Jan. 5 & 20. Nos. 6, 7 & 8. pp. 89–98; 112–123; 137–147.

WALKER (R. R.). **Kaolin in the Treatment of Asiatic Cholera: Its Action and Uses.**—*Proc. Roy. Soc. Med.* (Sect. of Therap. & Pharmacol.). 1921. Oct. Vol. 14. No. 12. pp. 23–29.

ENTERIC FEVERS IN THE TROPICS.

FLETCHER (William). **Incubation and Contact Carriers of Enteric Fever.**—*Studies from the Inst. for Med. Res., Federated Malay States.* 1921. Kuala Lumpur; F.M.S. Govt. Printing Office. 9 pp. With 6 charts.

"A," "B," "C," carriers of dysentery bacilli, and "D," a paratyphoid carrier, were under treatment for elimination of the respective germs. An acid-forming streptococcus was inoculated into gruel made of yeast and oatmeal and this gruel (after 24 hours' incubation) was given to the four men three times a day. The excreta were examined daily. "D," the paratyphoid carrier, was unfortunately permitted to assist in the preparation of the gruel. Treatment began on April 3, and ten days later *B. paratyphosus* B appeared in the stools of "A"; he passed through an attack of paratyphoid B fever. The bacillus was not found in his blood, but agglutinins were present. The men "B" and "C" were similarly infected from the contaminated gruel. The three recovered and the bacillus B disappeared. [It is evident that the acid-producing streptococcus was not able to reduce the virulence of the *B. paratyphosus* B either in the gruel or in the intestines. The question of carriers has been carefully considered in India and elsewhere; see this *Bulletin*, Index Vols., 1915, and onwards :—HARVEY (D.); SEMPLE (D.); GREIG (E. D. W.), etc.]

J. H. Tull Walsh.

THOMPSON (T. O.). **Notes on a Cutaneous Reaction for the Possible Diagnosis of Enteric Group Carriers—Enteric and Dysentery Convalescent Depot, Wellington.**—*Jl. Roy. Army Med. Corps.* 1921. Oct. Vol. 37. No. 4. pp. 302–311.

Captain Thompson, R.A.M.C., attracted by the "Typhoidin" test as used by GAY and FORCE [see this *Bulletin*, Vol. 11, p. 452], has carried out a small series of experiments on suspected carriers. The patients showed no local skin reaction to "a serum possessing high amounts of antibodies" to bacilli of the "enterica" group. Carriers did, however, show distinct local reaction "to toxins of dead cultures of a mixture of enteric group organisms." Controls were submitted to the same applications. Finally an ordinary "T.A.B." vaccine was used. The control solution for suspected cases was a sterilized normal saline solution. The reaction was noted every 24 hours until it finally disappeared :—(1) "Full red reaction with raised surface and oedema of area round"; (2) "Full red reaction extending beyond the area of scarification"; (3) "Red area of scarification"; (4) "No reaction beyond scratch marks." These remarks as they occurred are set down in the "Table" pp. 304–309.

The author concludes that: "The reactions and findings of this experiment taken as a whole are apparently reliable and satisfactory" as a quick test for the presence of one or other of the "enterica" group.

J. H. T. W.

SARRAILHÉ (A.). **Fièvre typhoïde et vaccinothérapie digestive.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1921. July. Vol. 12. No. 1. pp. 54–61. With 1 chart.

The author refers to the usual method of anti-enteric vaccination and seems to think that better methods might be found. Though extremely valuable the immunity is only for a year or so, and the anti-typhoid vaccines are not of much use in treatment. He describes, with full details, a case of typhoid treated with a vaccine given by the mouth. The vaccine contained T. A and B; about 1,000 millions of each per cc. The case was first seen by Dr. Sarrailhé on October 18, fourteen days after the commencement of the illness, and the first 60 cc. in three doses, at two-hour intervals, was given by the mouth on October 24. "Towards evening the symptoms improved. The patient became quiet and fell into deep sleep for two hours (from 6–8 p.m.). On awaking the patient's mind was clear, he asked for a drink and passed urine freely." The temperature sank from 39° C. to 38·7° C. On the 25th the temperature remained at 38·3° C. The doses of vaccine were repeated on that day and again on the 26th. There was a striking improvement in the patient's condition.

J. H. T. W.

ROMERO (N.). **Un cas d'ostéite paratyphique survenu, à la suite d'un traumatisme, chez un homme sain.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 5–7.

The author begins his paper with notes on the enterica bacilli in Chile. He points out that typhoid fever is endemic in Santiago. In 1913 there were 274 cases of enteric fever. *B. typhosus* was found in 89 per cent., *B. paratyphosus* A in 10 per cent. and *B. paratyphosus* B in 1·4 per cent. Certain atypical germs were also found.

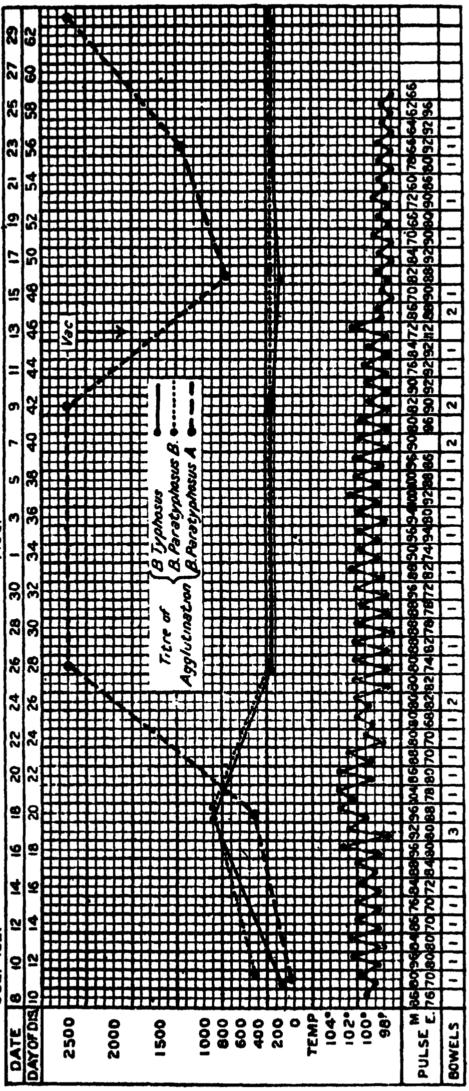
The patient was a man, aged 32, whose forearm had been severely crushed by a door. There was no wound, but marked contusion and great pain. After some days a swelling formed over the bruise. This burst at the end of 15 days, discharging thick creamy pus. A fistula remained with purulent discharge for eight months, at the end of which a bacteriological examination was made. A pure culture of *B. paratyphosus* B was obtained. The patjent's serum agglutinated the bacillus to 1 : 200 [*cf.* this *Bulletin*, GILDEMEISTER (E.), Vol. 11, p. 439].

J. H. T. W.

DIVE (G. H.) and a Note by Lt.-Col. J. C. KENNEDY. **A Case of Paratyphoid A Fever.**—*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 306–308. With 1 chart in text.

This case is of great interest because it occurred in a young man who had been inoculated with "T.A.B." vaccine in 1916, 1917 and 1918. He left Mesopotamia in June, 1921, and en route developed fever with general pains and malaria. He was admitted to the Queen Alexandra Hospital on July 8; temperature from 101° to 103° F. every evening. On July 11 some doubtful rose spots were noticed.

The stools were normal. As no organism specific of disease could be found diagnosis rested upon serum agglutination tests. These are well shown in the chart.



Graph illustrating Major Dive's Case of Paratyphoid A Fever.

It is remarked by Lt.-Colonel Kennedy that the "A" agglutinins appear to be the least responsive to an infection by another member of the group, and tend to appear later than those for "T" or "B." Hence the rise in "A" agglutinins between July 9 and 18, though the titre reached was only half that of "T" or "B," was regarded as most significant. The subsequent rapid rise of the "A" agglutinins to a high titre compared with the earlier response and subsequent subsidence of "T" and "B," as also the marked fall in "A" agglutinins, and the slight corresponding fall in the "T" curve following a dose of 50 millions paratyphoid "A" vaccine are well shown. The graph affords an interesting comparison between the agglutinin curve produced by a specific ("A") and that produced by a group stimulation ("T" and "B").

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

Treatment consisted of small doses of a pure paratyphoid A vaccine (50 million). Temperature normal on August 13 and convalescence rapid. Lt.-Colonel Kennedy thinks that anti-enterica vaccines have been used in too large doses and that in small doses they are of value in treatment. We know that the protection given for *B. paratyphosus* A only lasts for about six months.

J. H. T. W.

LEPROSY.

ALBERT (José). **The Experiment of Leper Segregation in the Philippines.**—Reprinted from *Jl. Philippine Islands Med. Assoc.* 1921. Vol. 1. pp. 133–143.

Dr. Albert is one of those to whom the system of compulsory isolation of lepers as a means of stamping out the disease makes no appeal. It is clear, throughout the whole course of his paper, that he has watched the Culion Experiment with critical and hostile eyes and that the results so far reported bring him no evidence of a sort to alter his views. He deals with the subject, however, in a perfectly frank and scientific spirit and sets forth his opinions in a trenchant and effective manner that will be of value in re-opening a much discussed question at a very appropriate moment.

With a view to counteracting the favourable opinions expressed by M. ROSENAU and Sir L. ROGERS on the Culion Leper Colony, Dr. Albert presents the annual admissions of lepers from July, 1906 to May, 1921, in the form of a Table which is here reproduced :—

TABLE I.—Number of Lepers admitted to the Culion Leper Colony.

From July to December, 1906	802
From January to December, 1907	690
From January to December, 1908	1,603
From January to December, 1909	1,378
From January to December, 1910	930
From January to December, 1911	889
From January to December, 1912	964
From January to December, 1913	795
From January to December, 1914	859
From January to December, 1915	555
From January to December, 1916	966
From January to December, 1917	613
From January to December, 1918	973
From January to December, 1919	551
From January to December, 1920	605
From January to May, 1921	381

Assuming that there has been no appreciable change in the population from which these admissions are drawn, it must be admitted that there is no significant reduction yet apparent. In the author's opinion, the Colony itself is very unpopular. " Administered," he says, " with the best of wishes, without sparing any expense to make life in the Colony attractive, the institution has never succeeded in gaining the sympathies of its sick inmates or the approval of the people." This view may be the correct one but, on the other hand, visitors well qualified to form a reliable opinion have been very favourably impressed, and the remarks of Sir Leonard ROGERS, summarized in this *Bulletin*, Vol. 17, p. 288, show that he at least was greatly impressed by the work at Culion. It is true that it is to refute this very expression of opinion by ROGERS that the paper under review is written, but the fact remains that an unbiassed examination of the facts by an acknowledged expert led him to the conclusion that the Colony was a success. We are not desirous of attempting to adjudicate upon the question of the Culion Colony nor do we think that the time is yet ripe to evaluate what is essentially an experiment. In leprosy, in which the incubation period is often prolonged and in which infection is usually contracted in childhood, it is clear that a long time must elapse before the Culion experiment can be fairly judged as to its effect in eliminating or diminishing the incidence of the disease. On the general question of the value of compulsory segregation of lepers, we are not inclined to be optimistic. In view of the shortcomings in diagnosis that must have existed prior to the modern developments of bacteriology it requires more faith than we have at our command to attribute the disappearance of leprosy from Europe during and after the middle ages to the compulsory segregation of those days. We hold, in the words of ROSENAU, quoted by Albert, that "there are factors in the control of leprosy not yet understood." But the fact that such an experiment as that of the Culion Leper Colony has been undertaken and that it is in the hands of competent persons backed with statutory and financial power to an unprecedented degree should make us very guarded in final expressions of opinion at the present time. Another twenty years and we shall be in a position to *know* whether segregation can or can not get rid of leprosy. In the meantime, it would be a thousand pities if local prejudice or premature conclusions were to deprive science of the fruits of what should prove, if carried through, a conclusive experiment.

S. Lyle Cummins.

MUIR (E.). **The Present Position of Leprosy in India.**—*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 375–379.

This paper commences with a brief survey of the present position of leprosy in India, which concludes with the opinion that there must be at least 100,000 pauper lepers in the country at the present time, and that there are probably five or ten non-pauper lepers for each of the hundred thousand. Figures like these form a valuable commentary on facile expressions of opinion in favour of a wide extension of compulsory segregation. The most important point to bear in mind is that this disease is especially liable to be contracted in childhood, and this fact is once more brought to notice by Dr. Muir, who says that "children are more especially interested in this disease . . . . about 45 per cent. of children being infected from leprous parents when they remain in contact with them, while only between 2 and 3 per cent. of husbands are infected from leprous wives, or wives from leprous husbands, where they remain together." We cannot help thinking that if only the Grancher system, employed so successfully in France for the avoidance of tuberculous infection in the children of the tuberculous, could be applied in India to the offspring of leper parents, much might be accomplished. Passing on to the question of treatment, Dr. Muir discusses the various methods of administration of the new remedies of the chaulmoogric acid series. His own preference is for the use of E.C.C.O. hypodermically according to the methods already described by him, this *Bulletin*, Vol. 19, p. 265, or, where the intravenous route is to be desired, the method of Dr. P. HARPER of Makogai, who uses chaulmoogra or hydnocarpus oil mixed with sulphuric ether and iodine in the following proportions :—

Chaulmoogra oil	500 m.
Sulphuric ether	500 m.
Iodine	1 gr.

This mixture is clear, and when injected intravenously causes neither capillary embolus nor obstruction of veins. The injections are given daily, at first in doses of 10 minims and then in doses of 20 minims. Coughing may be troublesome and Muir is therefore in the habit of using the tuberculin syringe supplied by Parke, Davies and Co., by which the injection can be given very slowly. The paper concludes with a warning that the time has not yet come to assert that leprosy can be permanently cured by the new drugs, although their great therapeutic activity is already proved beyond question. Time must show whether the disappearance of signs and symptoms under modern treatment is or is not permanent. In the meantime, with a view to clearing up the question of "cure," Dr. Muir is hopeful that "by means of provocative doses of the ethyl esters . . . . given intravenously in comparatively large doses we may be able to induce reactions in lepers which will distinguish them from leprosy-free controls."

S. L. C.

VALVERDE (Belmiro). **Implantação da lepra no Brazil.**—*Ann. Paulist. Med. e Cirurg.* 1921. May & June. Year 9. Vol. 9. No. 5–6. pp. 91–94.

The author finds reason to believe, from his researches into the history of leprosy in Brazil, that this disease was entirely absent when the country was first discovered by Europeans. The health of the aboriginal inhabitants must have been ideally good and such as is characteristic of a simple and primitive type of culture amongst surroundings to which the community has become adapted. The question to which discussion is directed is as to the source of the leprosy which is now endemic. Was it introduced chiefly from Africa with the slaves for the plantations or were the Portuguese colonists themselves responsible for its introduction? Dr. Valverde points out that although the slaves brought to the United States of America must have amounted to at least a million, leprosy never gained an important place in those regions, whereas it has become a formidable element amongst the diseases of the Latin-American countries. He considers that the main responsibility for the introduction of this malady rests on the European colonists, drawn from areas in which, in mediaeval times, leprosy was markedly prevalent. He finds a parallel case in Madeira, where the earliest colonists, criminals banished from their own countries, brought with them the leprosy then so common in Europe and furnished it with the conditions best suited to its continued endemicity.

S. L. C.

HENRY (—). **L'état actuel de la lèpre en Guyane.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 2. pp. 33–54.

The author draws a lurid picture of the views held by the stay-at-home part of the population of France as to the horrors of leprosy in the tropics; views founded to some extent on travellers' tales and to some extent also on the inherited fear of this disease that still exists in Europe as a legacy from the Middle Ages. At a moment when France has need of her sons to help in developing her colonial possessions, it is regrettable that these exaggerated ideas should obtain credence, and Dr. Henry is opportune with his report on leprosy in French Guinea, where former observers have believed the disease to be terribly common and unusually severe. It is shown, in the paper under review, that not more than about a hundred lepers exist at the present time in the city and environments of Cayenne, where former statements had claimed numbers varying from 300 (CLARAC) to 1,000 (GUILLON). Evidence at the disposal of the author leads him completely to deny the validity of the assertion frequently made that leprosy, in Cayenne, is common amongst the well-to-do classes. He gives, as the exact figures for Cayenne in 1920 amongst the upper classes, three cases in 116 families. It is particularly among the very poor that the disease is found. His enquiries lead him to the view that infection is usually acquired in childhood.

S. L. C.

VALVERDE (Belmiro). **Transmissibilidade da lepra.**—*Brazil Medico.* 1921. Oct. 8. Year 35. Vol. 2. No. 13. pp. 179–184.

After a general consideration of the evidence for and against the transmission of leprosy by ectoparasites, Dr. Valverde proceeds to discuss in considerable detail the evidence cited by Dr. Adolpho LUTZ in favour of the mosquito as a vector of the germs of this disease. He points out that in the four human diseases known to be transmitted by mosquitoes, filariasis, malaria, yellow fever and dengue, the evidence is clear, definite and experimentally sound. In the case of mosquitoes and leprosy, however, the position is very different; there being a marked lack of experimental support and a tendency to replace it by ingenious speculation. Valverde is completely opposed to LUTZ on this question and regards the evidence for the mosquito as the transmitting agent of leprosy as quite inadequate. He points out the great opportunities for the final solution of this question that are enjoyed by medical men working in Brazil and expresses the hope that the honour of successful research in this direction may fall to his native country.

S. L. C.

SERRA (Alberto). **Lepra e "Demodex folliculorum."**—*Pathologica.* 1921. Aug. 1. Vol. 13. No. 305. pp. 361–368. With 2 text-figs.

Following on the work of BORREL and more especially a recent communication by MAJOCCHI, in which the latter reported the co-existence of Demodex and lepra bacilli in 8 out of 11 cases of leprosy of which the comedones were examined, Professor Serra applied a carefully devised technique to the examination of 58 leprous patients in order to obtain all the information possible on this question. In a tabular statement of his results on page 362 of his report, we find, together with other details, that, in 17 cases of nodular leprosy of which the comedones of the nose, cheeks and forehead were carefully searched, Demodex was found in 10, Demodex together with lepra bacilli in 8; in 16 "mixed" cases, Demodex was present in 11 and both Demodex and bacilli in 5; while out of 25 anaesthetic cases, Demodex was found in 9 and with lepra bacilli in 2 cases. Two microphotographs, showing Demodex and bacilli together in the material expressed from a comedo from a case of leprosy serve to illustrate the text. The majority of "positive" findings of the three elements, comedones, Demodex and lepra bacilli, on the coexistence of which the research was based, were recorded from just those situations where leprous lesions are most common; the order of frequency being nose, alae nasi, temporal region, superciliary region, chin, front of ear, forehead and suprascapular region..

Attempts to transmit bacilli by means of Demodices from comedones of leprous patients might throw light on the question of whether these results are merely pathological coincidences or connected with the etiology of leprosy; but there are obvious difficulties in such an investigation. The author tried, with material from two "positive" cases of nodular leprosy, to pass on the Demodex and the lepra bacilli to two cases of anaesthetic leprosy in which no infected comedones could be found. One of these cases was lost sight of but, in the other, two months later, small numbers of Demodices and bacilli were found in the sebaceous glands of the ala nasi, on which the sebaceous material from the "positive" cases had been spread. This experiment serves, at least, to show that Demodex can pass from man to man and perhaps carry with it Hansen's bacilli. Attempts to infect dogs, in which an itch caused by an allied Demodex occurs, by the same means led to no conclusive result, nor was any important information obtained from attempts to infect the anterior chamber of the eye of a group of rabbits by means of sebaceous material containing lepra bacilli, though the author had previously shown that the introduction of small portions of leprous tissue into this situation leads to proliferation of the bacilli.

The author discusses the view expressed by MAJOCCHI that the Demodex acts not only as a vector of lepra bacilli but also as an irritant body, setting up a perifollicular inflammation, and facilitating the entry of the bacilli into the surrounding tissues, but thinks that the histological appearances of lepromata are against the hypothesis of a perifollicular origin. It is more likely that, as a result of the irritation set up by the Demodex, motile connective tissue cells carry the bacilli through the wall of the follicle into the surrounding tissues. In conclusion, while regarding the question of the possible rôle of *Demodex folliculorum* as a carrier of leprosy as still unsettled, the author considers that the evidence is sufficient to justify extensive research.

S. L. C.

NOËL (P.). **Menstruation et fécondité dans la lèpre.**—*Ann. Dermat. et Syph.* 1921. Oct. 6th Ser. Vol. 2. No. 10. pp. 396–400.

This valuable though brief paper puts to the test of actual observation the much debated question whether leprosy has any marked effect in interfering with the functions of the female genital organs.

The author, having under his care at the Leper Asylum of Yaounde, in the Cameroons, about 400 patients of whom 183 are females, decided to investigate this problem. Setting aside 16 cases too young to have yet menstruated, there remain 167 women and girls of whom 146 suffer from the anaesthetic, 9 from the nodular and 10 from the mixed form of the disease.

His conclusions are as follows:—

1. Menstruation is not modified by leprous infection, appearing regularly, and continuing in a normal manner until the menopause.

2. Allowing for such circumstances as a repulsive appearance due to the disease, lessened opportunities of impregnation and the admitted frequency of leprous orchitis in the infected males with whom alone, for the most part, cohabitation is possible after manifest infection, there is no notable diminution of fecundity as a result of this disease.

S. L. C.

MATTOS (Belfort). **Manifestações corneanas da lepra.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* 1921. May. Vol. 4. Ser. 2. No. 3. pp. 68–72.

This is an excellent account of the corneal changes due to leprous infection, the report being based on the examination, by the author, of the cases under isolation in the Leper Hospital of Guapira. Of 224 patients no less than 77 per cent. suffer from ocular lesions, and this is thought to be an understatement as the facilities for intraocular examinations are not such as to give final results. The corneal lesions in leprosy may result either from direct infection of the corneal tissue by the disease, or from the exposure to drying and dust consequent on the "lagophthalmos" so common in leprosy as the result of scarring and the loss of sensation in the conjunctiva due to leprous disease of nerves. The lesions of the cornea truly leprous in origin are as follows :—

Keratitis parenchymatosa leprosa, or the interstitial form.

Leproma of Cornea, or the hyperplastic form of leprous keratitis. The parenchymatous form, again, may be either of the chronic variety or acute or hyperacute in character. A full account of these various forms, illustrated by short descriptions of typical cases, is given and the original paper should be studied by all those working at the ophthalmological problems of leprosy.

S. L. C.

NEAME (Humphrey). **Case of Leprosy affecting the Conjunctiva and Cornea.**—*Proc. Roy. Soc. Med.* (Sect. of Ophthalm.) 1921. Mar. Vol. 14. No. 5. pp. 16–20. With 1 photograph.

The patient had spent many years both in East Africa and in India. Eight years ago spots appeared on the arms a short time after the cauterization of a swelling on the right forearm. He is now a well-marked case of nodular leprosy, with leonine expression, loss of eyebrows, nasal obstruction and large numbers of lepra bacilli in the nasal discharge. Anaesthesia is relatively ill-marked nor are there any very definitely enlarged nerves.

The eye condition is briefly as follows :—

Lids and surrounding skin are infiltrated, the conjunctiva shows an early nodular condition and sections of an excised portion exhibit very numerous lepra bacilli though but little cellular reaction. The cornea shows a definite haze, seen with the loupe to consist of a fine white stippling. The pupils are small and fixed. Vision is considerably impaired. It is open to question whether there is uveitis or not. Treatment by means of sodium morrhuate intravenously and by injections of sodium gynocardate have been used for some little time, but not long enough to enable any opinion as to their effects to be formed. The author quotes the cases of ocular leprosy reported by Treacher COLLINS in this country and LIE in Norway to illustrate the long period of incubation of the disease.

S. L. C.

CASTEL. **Un cas de lèpre à Roubaix.**—*Bull. Soc. française de Dermat. et Syph.* 1921. 28th Year. No. 1. pp. 23–24. With 2 figs.

The author describes a case of nodular leprosy arising, during his residence at Roubaix, in a Frenchman aged 36 years, who had passed five years of penal servitude abroad at St. Laurent, the Iles du Salut, Cayenne and Martinique. Prior to the appearance of the disease, the patient had lived in close association with groups of the labouring population of Roubaix and had cohabited with a woman for four years. The author indicates the ease with which this disease might implant itself in circumstances such as these, and raises the question as to what the attitude of the medical man ought to be with regard to the associates of such a case in view of the long incubation period of leprosy.

S. L. C.

GOUGEROT & RUPPE. **Lèpre neutrotrope : Lèpre familiale nerveuse "pseudo-vitiligineuse."**—*Bull. Soc. française de Dermat. et Syph.* 1921. No. 8. pp. 398–400.

This note records a case of leprosy treated in France but contracted in Tahiti. The family history is remarkable, the father being at present in a Leper Hospital in Tahiti, one brother being dead of the disease, while another brother and a sister have also contracted leprosy; and the patient now under consideration has a son, aged 14, who shows a form of the disease almost exactly similar to that of his father. All the cases in this family have had the maculo-anaesthetic form, and the authors are inclined to find in this fact an indication that there may be a specially differentiated type of leprosy bacillus with a "neurotropic" tendency, just as there is said to be a neurotropic treponema slightly different from the *Treponema pallidum.* This is an interesting line of speculation, but there is much reason to think that there may be other factors, such as a certain degree of acquired immunity to explain the nerve type of leprosy, and it would be unwise to draw conclusions from an observation based on one family group. The history, however, is a most striking one and may be commended to those who have doubts about the infectivity of leprosy.

S. L. C.

REPORT OF THE PHILIPPINE HEALTH SERVICE FOR THE FISCAL YEAR FROM JANUARY 1 TO DECEMBER 31, 1920. [Vicente de JESÚS, Director of Health.]—497 pp. With 9 folding charts & 19 plates. 1921. Manila: Bureau of Printing.—Modern Treatment of Leprosy. (pp. 41–55.)

On May 3, 1920, a Leprosy Investigation Committee was appointed by the Director of Health of the Philippine Health Service, and it is the work of this Committee that is summarized in the pages under review. Seventy-six patients were selected from the patients at San Lazero, cases with active lesions being taken irrespective of the duration or extent of the lesion. The entire 76 were divided by the Committee into five groups in such a way that those below 15 years, those between 16 and 40 and those above 40 years were equally divided among the five groups. Five preparations were used, one being employed for each group. These five preparations were as follows :—

1. Sodium gynocardate "A" (the hydnocarpate of ROGERS).
2. Sodium gynocardate "S" the sodium salts of the fatty acids of chaulmoogra oil.
3. Sodium morrhuate, the sodium salts of the total fatty acids of cod liver oil.
4. Chaulmoogra emulsion "S" (or Collobiasis substitute); an emulsion containing chaulmoogra oil and acacia.
5. Mercado mixture, of which the formula is :—Camphorated oil 10 per cent., and chaulmoogra oil, āā 60 cc., resorcine 4 gms., purified ether, 2·5 cc.

The first three preparations were given by the intravenous route, the last two by the intramuscular or the subdermal, while in some cases these methods were combined. The first three were given in doses starting with 0·5 cc. and increasing by 0·5 cc. at a time up to 12 cc. (morrhuate) or 15 cc. (gynocardate " A " and " S "). The Collobiasis was given, as a rule, in 2 cc. doses, while the Mercado mixture, from an initial dose of 0·5 cc. was raised to a maximum of 8 cc.

Of these preparations, gynocardate " A " was found to give the least severe reactions and to lead to the best results, 86 per cent. of the cases showing some degree of improvement. The gynocardate " S " gave but little constitutional reaction, but at times led to considerable pain during injection; 60 per cent. of cases were more or less improved. Sodium morrhuate, as noted elsewhere, was found in the Philippines also to give rise to frequent thrombosis of veins. It gave 75 per cent. of improvements, whereas the Mercado mixture, by far the most painful both in its immediate and remote effects, led to improvement in 64 per cent. of the cases treated. The chaulmoogra emulsion, while giving rise to very little reaction, only led to 38 per cent. of improvements. In its recommendations, the Committee makes the following suggestions :—

" 1. That one or more of the above methods of treatment be made available for all the segregated lepers in the Philippine Islands.

" 2. That the present investigation be continued on a larger scale with a view to further improving the methods of treatment.

" 3. That a Board or Committee be created with ample powers and facilities to carry on this work."

S. L. C.

HARPER (Philip). **Progress Report on the Treatment of Leprosy by the Intravenous Injection of Chaulmoogra Oil.**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 2. Vol. 25. No. 1. pp. 2–4. With 1 plate.

This paper reports on the treatment of over 200 cases of leprosy by intravenous injections of chaulmoogra oil at Makogai Asylum, Fiji. Over 26,000 injections have been given since the treatment was started, without serious ill-effects, though two subcutaneous abscesses attributed to faulty technique have been recorded.

There are some interesting remarks of the " treatment reaction " which is frequently observed, may last as long as three weeks, and is followed by rapid improvement; and the appearances " before and after " this reaction are illustrated by two photographs. Of 38 cases included in a list forming part of this paper, 28, or over 70 per cent., improved, one died of influenza, three got appreciably worse and in six cases no change could be observed.

S. L. C.

HOLLMANN (Harry T.). **The Fatty Acids of Chaulmoogra Oil in the Treatment of Leprosy and Other Diseases.**—*Arch. Dermat. & Syph.* 1922. Jan. Vol. 5. No. 1. pp. 94–101.

After a useful summary of previous work on the use of oil of chaulmoogra in various preparations permitting of its subcutaneous inoculation, Dr. Hollmann describes his own initial work and the methods devised, in co-operation with him, by Miss Alice BALL, an instructress in chemistry at the College of Hawaii, of obtaining the active agents of chaulmoogra oil. The problem was solved by the successful production of the ethyl esters of the fatty acids concerned. The process used by Miss BALL results in the separation of four fractions as follows :—

(*a*) Ethyl ester of chaulmoogra oil.

(*b*) Ethyl esters of acids crystallizing from alcohol with chaulmoogric acid in the initial separation.

(*c*) Ethyl esters of acids soluble in 92 per cent. alcohol in first separation and which form ether-soluble lead salts.

(*d*) Ethyl esters of acids forming lead salts insoluble in ether.

Mention is made of the results obtained by ROGERS and by MUIR with sodium morrhuate, as well as of the observations of NEVE with this latter preparation.

An important fact, noted by NEVE as well as by Hollmann, is that some of the cases show what might be thought to be a fresh manifestation of the disease while under treatment. This, in the opinion of Hollmann, is not a fresh manifestation of the disease but "an inflammatory reaction in previously unrecognized foci of the disease."

In the hands of Dr. Hollman, treatment with the ethyl esters has led 84 patients under his care at Kalihi Hospital to become bacteriologically negative and free from all lesions of the disease. The period of treatment in these cases has varied from four years to three months; 76 per cent. of the patients were under treatment from 6 months to 2 years. No less than 60 of these 84 patients had nodular leprosy. Of the total, 21 were incipient cases, 40 moderately advanced and 23 advanced cases of the disease.

Two patients suffering from pulmonary tuberculosis and two lupus cases were treated by means of the ethyl esters, the results being strikingly good in one of the lung cases and in both the cases of lupus.

A very clear and lucid description of the technique used by Miss BALL for the preparation of the ethyl esters of chaulmoogra oil is given and should be read in the original.

S. L. C.

MARCHOUX (E.). **Traitement de la lèpre par les savons d'huile de foie de morue et d'huile de chaulmoogra.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 520–523.

This brief paper sounds a doubtful note as to the efficacy of the salts of the unsaturated fatty acids of chaulmoogra oil in leprosy. So universal has been the agreement as to the beneficial effects of these preparations that it is almost with a sense of relief that we turn to a paper that preserves a critical attitude. Marchoux, with E. FOURNEAU, during 1913–14, had tried the gynocardate of soda, sufficiently thinned to be injectable without much pain, in two cases of leprosy; and had even experimented with the ethyl esters of these fatty acids given by the mouth. These trials led to no results of value and were abandoned on the author's hearing that the products of *Gynocardia odorata* were of low efficiency and only those of *Taraktogenus kurzii* of real use. Later, on the publication of the work of L. ROGERS and others, the experiments were resumed both with a sodium morrhuate and a sodium gynocardate prepared by E. FOURNEAU and afterwards with preparations sent from India by Sir Leonard ROGERS himself. Four cases were treated by intravenous injections with a dosage similar to that employed by ROGERS. On two occasions only were intramuscular inoculations tried, but these caused much pain and were abandoned forthwith. All the cases treated showed considerable focal reaction. In none was any benefit noted. To control these observations by animal tests the treatment was tried in "rat-leprosy" caused by intraperitoneal injection of cultures; but here again, the drugs seemed merely to aggravate the symptoms, not to lead to their amelioration.

We are not inclined to regard this work of M. Marchoux as sufficiently extended to justify conclusions adverse to the new remedies. The treatment was only continued for about five months—a period that may often have to be exceeded to obtain favourable results. Again, it seems that the dosage was either maintained or increased during this treatment, in spite of marked focal reactions; but many physicians would have thought it advisable to diminish the quantities under these circumstances. As for the "rat-leprosy" experiments, the rapid and acute infection determined by intraperitoneal injection of living bacilli is not perhaps quite comparable with the slow processes of incubation and gradual invasion of leprosy in man; and the latter may be accompanied by some degree of acquired resistance, making cure more probable under appropriate treatment. We like the critical attitude of M. Marchoux and, while venturing to doubt the finality of the rat experiments, we welcome the attempt to try out the new preparations by animal tests. But much more work is necessary before these results can be seriously held to detract from the almost unanimously favourable reports of those who have treated large numbers of patients with the fatty acid derivatives of chaulmoogra oil.

S. L. C.

WILDISH (G. H.). **Antimony in Leprosy.**—*Brit. Med. Jl.* 1922. Jan. 14. pp. 55.

Dr. Wildish, at the Amatikulu Leper Institution, Zululand, treated 20 of the worst cases, "mostly cripples who were housed in the central hospital while awaiting death," with oscol stibium as advised by CAWSTON (see this *Bulletin*, Vol. 17, p. 284; Vol. 18, p. 405). The drug was given intramuscularly in doses of 2·5 cc., 3 cc., and 6 cc. on consecutive days. Three weeks later, 4·5 cc. and 6 cc. were given on consecutive days; and this was repeated during the next two months. Only one patient failed to respond. The beneficial effects were marked, including relief of paralysis, drying of ulcers and better general condition. Even the Zulus, who dislike injections, think the treatment beneficial and ask for more. The oscol stibium treatment combines well with that by the ethyl esters of chaulmoogra oil. Six cases are quoted in detail. Over 1,000 injections have been given in a period of six months, without mishap.

S. L. C.

ARCHIBALD (R. G.). **Notes on a Case of Tubercular Leprosy treated by Intravenous Injections of Stibenyl.**—*Jl. Trop. Med. & Hyg.* 1921. Nov. 1. Vol. 24. No. 21. pp. 277–278. With 1 plate.

Having had a previous opportunity of witnessing a promising result from the use of intravenous injections of colloidal antimony sulphide in a leper, though the case could not be followed up, Major Archibald decided to treat by means of stibenyl, the sodium salt of *p*-acetylaminophenylstibinic acid, a case of nodular leprosy in a Sudanese patient aged 40 who had had the disease for four or five years, and in whom the diagnosis had been confirmed by the finding of lepra bacilli in smears from the lepromata and the nasal mucous membrane. Four courses were given, each of six injections on alternate days, each course being separated from the next by an interval of 14 days. The dosage in the successive injections was 0·15, 0·2, 0·4, 0·5, and 0·6 gm. of the drug, given as a 1 per cent. solution in sterile normal salt solution or water. The author noted marked improvement in the lesions, a tendency to the substitution of coccal and beaded forms for the bacillary forms at first noted in smears, and a great improvement in the voice, which had been raucous from leprous laryngitis. He regards the results as more striking than any obtained by him with sodium gynocardate and advocates a trial of the drug in early cases.

S. L. C.

WAYSON (James T.). **Use of** *Aleurites triloba* **or** *Aleurites moluccana* **in the Treatment of Leprosy.** [Correspondence.]—*Arch. Dermat. & Syph.* 1921. Dec. Vol. 4. No. 6. p. 818.

In a short letter to the editor, Dr. Wayson suggests that the fatty acid derivatives of the oil of *A. trilobata* or *A. moluccana* may prove of great value in the treatment of leprosy. Commonly known as the Kukui tree, the Aleurites is widely distributed throughout Polynesia, the Philippines and India. The author has succeeded in combining fatty acids of this group with iodine and has great hopes of the future utility of this preparation.

Experimental work on these lines in the treatment of leprosy will be awaited with interest.

S. L. C.

TUBERCULOSIS IN THE TROPICS.

UNION OF SOUTH AFRICA. Department of Mines and Industries. **Reports of the Miners' Phthisis Board for the Period 1st August, 1919, to 31st March, 1920, and of the Miners' Phthisis Medical Bureau for the Year ended 31st July, 1920, together with the Report of the Controller and Auditor-General for the Former Period.** 1921. 92 pp. Cape Town: Govt. Printers. [Price 7*s.* 6*d.*] [U.G. 38–'21.]

For the portion of these communications bearing upon tuberculosis in the tropics, we turn to the Report upon the work of the Miners' Phthisis Medical Bureau (pp. 26–77) in which Dr. W. WATKINS-PITCHFORD (Chairman) deals with the examinations of native labourers and non-European miners. Here we find, set forth in tabular form, the results of careful observations on native labourers from 1916–17 to 1919–20, so far as regards "pure" tuberculosis, "pure" silicosis and "tuberculosis with silicosis."

EXAMINATIONS OF NATIVE LABOURERS.

	1916–17.	1917–18.	1918–19.	1919–20.
Average number of all native labourers	191,202	180,415	171,959	178,571
Approximately average number employed underground	151,814	131,181	129,480	134,591
Number examined by Bureau ..	1,746	1,501	1,495	1,999
Percentage of underground complement examined	(1·15)	(1·14)	(1·15)	(1·48)
Number and percentage found free from compensatable disease ..	300 (17·18)	292 (19·45)	281 (18·8)	685 (34·26)
"Pure" Tuberculosis.				
Number of cases	1,103	946	789	794
Percentage of examinees	(63·17)	(63·02)	(52·77)	(39·72)
Prevalence-rate, per 100;000 of all native labourers	(576)	(524)	(458)	(444)
"Pure" Silicosis.				
Number of cases	91	31	47	126
Percentage of examinees	(5·21)	(2·06)	(3·14)	(6·3)
Ante-primary stage	—	—	—	74
Primary stage	84	31	44	50
Secondary stage	7	0	3	2
Prevalence-rate (1y. and 2y. stage), per 100,000 of all native labourers	(47)	(17)	(27)	(29)
Tuberculosis with Silicosis.				
Number of cases	252	232	378	394
Percentage of examinees	(14·43)	(15·45)	(25·28)	(19·7)
Ante-primary stage	—	—	—	37
Primary stage	83	32	63	89
Secondary stage	169	200	315	268
Prevalence-rate, per 100,000 of all native labourers	(131)	(128)	(219)	(220)

It will be noted that there has been a steady fall in the total numbers of cases and in the percentage of examinees found to be suffering from "pure" tuberculosis while, as pointed out by Dr. Watkins-Pitchford, this fall has not been arrested by the additional scrutiny entailed by the final examination introduced by the 1919 Act.

A highly interesting record, since it is based on careful post-mortem investigation, is found in Schedule IV of the statistical portion of the Report, in which are set forth the pathological findings of lungs and sputum in miners and in natives respectively during a period of one year. This schedule is here reproduced on account of the contrast which it presents between the findings in Europeans and natives.

SUMMARY OF RESULTS OF PATHOLOGICAL EXAMINATIONS OF LUNGS AND SPUTUM.
(*August 1, 1919, to July 31, 1920.*)

Lungs.

Changes present.*	Miners.	Natives.	Totals.
Silicosis alone	19	4	23
Silicosis with tuberculosis	23	170	193
Silicosis with lobar pneumonia	6	1	7
Silicosis with tuberculosis and lobar pneumonia	2	17	19
Silicosis with influenzal pneumonia.. ..	9	1	10
Silicosis, tuberculosis, and influenzal pneumonia	4	18	22
Silicosis with empyema	1	—	1
Silicosis with tuberculosis and empyema ..	1	—	1
Silicosis with abscess	1	—	1
Tuberculosis alone	3	100	103
Tuberculosis with lobar pneumonia ..	1	12	13
Tuberculosis with influenzal pneumonia ..	—	2	2
Tuberculosis with lobar pneumonia and pleurisy	—	1	1
Lobar pneumonia alone	2	14	16
Pleurisy	—	6	6
Influenzal pneumonia alone	6	11	17
Empyema	1	—	1
Gangrene	—	2	2
Secondary cancer	1	—	1
No signs of disease	15	30	45
Totals (Pairs of lungs) ..	95	389	484

* This is not, of course, identical with "cause of death"; in many instances death had been due to causes entirely unconnected with silicosis.

Sputum.

Source.	Number of Specimens.†	*B. tuberculosis* present.	*B. tuberculosis* not found.
		Percentage	
Miners and European mine employees	980	105 (10·71)	875
Native mine labourers	483	125 (25·87)	358
Totals ..	1,463	230 (15·72)	1,233

† More than one specimen was frequently received from the same individual when the first result had proved negative.

While 19 out of 95 pairs of lungs from miners, or 20 per cent., showed silicosis alone, only 4 out of 389 pairs of lungs from natives, or just over 1 per cent., exhibited this condition. On the other hand, the percentage of natives with pure tuberculosis and with tuberculosis coexisting with silicosis is very much higher than that among the miners. In view of this we infer, though it is not stated in the report, that the natives die too soon from, or are too early infected with, tuberculosis to allow of many surviving long enough to enable pure silicosis to reach its final stages. The fact that no less than 25·87 per cent. of the sputa submitted for examination from native mine labourers proved to be positive speaks for itself. The greater part of the report deals not with tropical but with industrial tuberculosis so is not summarized in this notice; but we strongly recommend all those interested in the effects of inorganic dusts upon the lungs to consult the original report, which constitutes a most important contribution to the subject. Dr. Watkins-Pitchford and his colleagues on the Staff of the Medical Bureau are to be congratulated upon a communication which throws much light upon the problems of tuberculosis and silicosis, and which demonstrates the admirable results that may follow well organized and skilfully executed team-work.

S. Lyle Cummins.

WATKINS-PITCHFORD, IRVINE (L. G.) & SMITH (J. M.). [**Discussion upon Silicosis and Tuberculosis in Native Mine Labourers.**]—*Proc. Transvaal Mine Med. Officers' Assoc.* 1921. Sept. Vol. 1. No. 6. pp. 1–15.

This very important communication on the subject of miners' phthisis resulted from an invitation by the President of the Transvaal Mine Medical Officers' Association to the Chairman and Members of the Miners' Phthisis Bureau to introduce a discussion upon silicosis and tuberculosis. Dr. Watkins-Pitchford, in a short preliminary statement, introduced Drs. Irvine and Smith, whose duty it would be to give an account of the views of the members of the Bureau on this subject. He called attention to two matters of considerable importance, as between the Mine Medical Officers and the Bureau, upon which he hoped that fuller co-operation would be of help to both. The first was the providing by the Mine Medical Officer of a brief history of every patient sent to the Bureau Officers for examination; the second, that more attention should be given to the body weight of the natives. The Bureau has found it essential to make systematic reference to standards and to periodical records of body weight. For this purpose it has adopted the standards found applicable by the Medico-Acturial Investigation of the U.S.A. (1912), which represents the averages of over 200,000 observations. In the opinion of Dr. Watkins-Pitchford, these standards are applicable, with considerable accuracy, to the natives under discussion, save that the herbivorous Hindoo must be excluded. He points out, however, that if a wider experience shows that certain tribes or races exhibit appreciable divergence from these standards, it will become possible to work out the error and take it into account in evaluating the observations made. It is the practice of the Bureau to reject as unfit any native who is deficient in weight to the extent of more than one tenth of the standard for his age and height; but, if there is no trace of chronic pulmonary disease, the rejection is only temporary. Thus, if the standard weight of a man 5 ft. 8 in. high and aged 30 years is 152 lb., he must not fall short of this by more than 15·2 lb. As this method of standardization is likely to be of service to medical men working in the tropics, the table of Body Weight in Health is reproduced in this *Bulletin* as given by Dr. Watkins-Pitchford.

BODY WEIGHT IN HEALTH.

According to Height and Age.

Height. *ft.*	*in.*	20 *years.* *lb.*	30 *years.* *lb.*	40 *years.* *lb.*	50 *years.* *lb.*
5	0	117	126	131	134
5	1	119	128	133	136
5	2	122	130	135	138
5	3	125	133	138	141
5	4	126	136	141	144
5	5	132	140	145	148
5	6	136	144	149	152
5	7	140	148	153	156
5	8	144	152	158	161
5	9	148	156	163	166
5	10	152	161	168	171
5	11	156	166	174	177
6	0	161	172	180	183
6	1	166	178	186	190
6	2	171	184	193	197
6	3	176	190	200	204
6	4	181	196	206	211

It is to be noted that, while the weight is soon affected in cases complicated or concurrently infected with tuberculosis, silicosis by itself does not lead to any appreciable loss of weight.

The discussion was now opened by the reading of their paper by Drs. Irvine and Smith. This paper treats of the subject under two main headings, the diagnosis of silicosis and the diagnosis of tuberculosis.

I. The Diagnosis of Silicosis :—

The first paragraphs of this part of the paper are devoted to explaining the Miners' Phthisis Act, of 1919. Here we are at once presented with one of those confusions of nomenclature that appear inseparable from Acts and other legal documents drawn up by persons dealing with medical subjects from the purely administrative standpoint. The three legal stages of silicosis are described in the Act as "ante-primary," "primary," and "secondary," which are, in the words of the readers of the paper, best described simply as first, second and third stages. Thus we get such headings as the following appearing in the text: (2) The Second (or Primary) Stage! These obscurities of the Act are not, however, reflected [in any want of clearness] in the excellent paper by the authors, who contrive to epitomize, in a short communication, the very valuable contribution that is being made to the subject of silicosis and tuberculosis by the investigations of the Bureau.

For these observers, the outstanding pathological features of silicosis are as follows :—

1. It is always a more or less generalized disease.
2. The silicotic fibrosis originates in and around the lymphatic channels of the lungs and pleurae; and is a progressive condition of lymphatic obstruction in the lungs.

3. Probably in direct consequence of this obstruction, the silicotic lung is prone to be attacked by various infections and particularly by tuberculosis.

In the opinion of the authors as well as from the findings of MAVROGORDATO, it is the case that the appearance of extensive areas of fibrotic consolidation, as opposed to distributed fibroses along lymphatic channels, is always a sign of superimposed infection.

The following interesting paragraph serves to bring out the different behaviour of the natives and the European miners in their response to tuberculosis :—

"The association of tuberculosis with silicosis is, of course, very common, especially amongst natives, and may occur at any stage of the latter disease. At the present time it is practically true to say that those who die from the disease die from this complication. In the case of European miners a condition of apparently uncomplicated silicosis usually precedes by a longer or shorter period the appearance of tuberculosis."

A good account of the radiographic and clinical signs of silicosis at its different stages follows and should be studied in the original by those interested in the disease.

II. The Diagnosis of Tuberculosis :—

For the purposes of the Act, a person is deemed to be suffering from tuberculosis when he is found by the Bureau to be :—

(*a*) expectorating the tubercle bacillus ; or

(*b*) to have closed tuberculosis of such a degree as seriously to impair his working capacity *and* to render his removal from underground work advisable in the interests of his health.

Details are given of the grounds on which a diagnosis of tuberculosis is made and it is evident that the Bureau has organized efficient teamwork to this end. European miners suspected to be suffering from this complaint are usually admitted to hospital for a period of observation. The system of investigation of native cases is detailed and appears to be sound in every respect. It is interesting to note that, as elsewhere in Africa, the Members of the Staff of the Bureau call attention to the severity of the disease in these natives. "Pulmonary tuberculosis in the native, at least in our experience, is in most instances a very acute condition." They "are usually acutely ill and in many cases the disease is rapidly fatal. In uncomplicated cases the post-mortem examination nearly always reveals an extensive caseating broncho-pneumonia although in some cases miliary tuberculosis is the form present." A very able paper is closed with the following excellent advice :—"We are convinced that no decision upon a chest, in any but cases of gross change, should be made without the *conjunction* of clinical and radiographic examination."

S. L. C.

DODDS (A. B.). **Detection of Tuberculosis.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1921. Oct. Vol. 1. No. 7. pp. 1–2. (Discussion pp. 2–6.)

In raising the question of the early detection of tuberculosis Dr. Dodds focussed attention on one of the burning problems upon which the future of the use of native labour in the mines is certain to turn.

He pointed out the great monetary loss to the mining industry for compensation, as well as the serious mortality from this disease, and the risk of infection amongst the native population. He then gave a short description of his methods of examination and the points which should lead to rejection of natives, laying much stress upon the value of the weight as an index, especially when considered in relation to physical standards of height, age, etc. In his experience, East Coast and Basuto natives are more susceptible to the disease than the Cape Colony natives.

A valuable discussion followed in which Dr. ORENSTEIN pointed to the difficulty of early repatriation introduced by the fact that the disease was of such rapid development. "If they repatriated people who were foci of infection, they would infect others in their kraals, so that one was simply spitting into the well from which they had to draw their water." This picturesque expression appears to fit the situation very well, and it is clear from the trend of the discussion that the difficulty of the problem is appreciated by the medical men in the Transvaal. The following resolution was carried :—

"That a Central Examination Board be created at which the final examination of all recruits is to take place, exclusive of voluntary boys."

This expression of opinion, indicating the general feeling that medical examination should be made as thorough as possible with a view to early diagnosis, is all to the good and points the way to a great improvement in the conditions of native labour in the mines.

S. L. C.

BAQUÉ (B). **Hygiène générale et tuberculose dans les oasis du Souf (Sahara constantinois).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 250–261.

After a brief description of the climatic and meteorological conditions in the districts under consideration, the author proceeds to deal with the results of the von Pirquet tuberculin test applied to different sections of the inhabitants. The total "von Pirquet Index" for the communities of the Souf comes to 59·72 per cent., calculated upon a total of 878 persons, of whom 661 were children and 217 adults. Tabulated in age-groups, the percentages are as follows :—

1 to 5 years	21·51 per cent.
6 to 15 years	56·36 ,,
Over 15 years	75·57 ,,

It would seem that the proportion of "positive" reactions is considerably higher in the Souf than in regions of the Sahara. Thus, in the Figuig region, the von Pirquet Index is only 11 per cent. for children up to 15 years and 35 per cent. for adults ; at Tidikelt, 27 per cent. for children, 53·5 per cent. for adults ; while, in the Ouargla district the total index for the whole population examined is 36·5 per cent.

The author thinks that race has but little to do with the epidemiology of tuberculosis in the Sahara. Fifty years ago, the country was free from the disease. Now tuberculosis is common and progressive, introduced from the north and east by the Souafa emigrating into Tell and the Djerid. The susceptibility of the natives is attributed to drunkenness, venereal disease, and to the fact that the disease has only recently been introduced, so that the inhabitants have not yet developed much resistance. With all this, the living together of infected and uninfected subjects is common and affords every facility for the spread of the disease.

S. L. C.

SCOTT (Henry Harold). **The Prevalence and Character of Tuberculosis in Hongkong.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 381–396.

This paper, which is Part III of that reviewed from the original MSS. in this *Bulletin* (see Vol. 18, pp. 376–379), deals with the "Morbid Anatomy as met with in Cases among Children" from the rich post-mortem material investigated by Dr. Scott at Hongkong.

Since this excellent paper, which deserves study by all those interested in tuberculosis, has already been reviewed in these pages, only a brief supplementary notice need now be given. The main interest of the work, apart from the fact that it forms a unique record of post-mortem findings in tuberculous children in a locality where bovine infection can be excluded, lies in the commentary which it makes to the work of A. GHON and to the observations of R. G. CANTI as to the frequency with which a primary lung focus is to be found in the cadavers of children with tuberculosis of the mediastinal and bronchial glands. The findings of Dr. Scott, though in the main confirmatory, are not entirely in line with those of the authors quoted. While he states that CANTI's observations have been "substantiated in the majority of the present series," he adds that "in 29 instances, ... caseous mediastinal glands were found without any focus being detected in the lungs." Of these, at least 17 would seem to have been unequivocal. A point of interest is the fact that of nine instances of focal tubercles in the brain, no less than eight were situated in the cerebellum. The author notes as a striking feature the rarity of bone, joint and skin affections. Of the 225 cases in the series, "there were five with tuberculous ulcers of the skin, four of these on the face and neck and one on the forearm. Not a single instance of tuberculous joint disease was encountered, and only three with bone lesions."

The cases reported seem to the reviewer to show a marked tendency to generalization of infection through the blood stream, perhaps even to a greater extent than might have been expected in the age-groups investigated. The work is of the highest quality and the paper constitutes a record of great value to the student of tuberculosis.

S. L. C.

DE MEDEIROS (Aumaury). **O problema da tuberculose.**—*Brazil Medico.* 1921. Oct. 15. Year 35. Vol. 2. No. 14. pp. 197–201.

This paper is an address to a Conference by one who evidently has a wide experience of tuberculosis and has devoted much time to Red Cross work in connexion with this disease. The paper has but little bearing on "tropical tuberculosis," but is of interest to those connected with educational campaigns destined to form part of the war against this social disease. Like FONTES, Dr. de Medeiros holds the view that acquired immunity plays a dominant part in the epidemiology of tuberculosis, a process of natural vaccination affording much of the power that is manifest by adults in resisting Koch's bacillus; but he urges that considerations of this kind should in no way militate against the efforts of hygienists to limit the dissemination of the germ. He attributes to what he calls the "isolation" of the bacillus, as opposed to the "isolation" of infective persons, the rarity of infection amongst doctors and nurses in tuberculosis hospitals. We are inclined to attribute this often-quoted immunity of the staffs of such hospitals to acquired resistance rather than to the precautions taken in these institutions to prevent the dissemination of germs; but no doubt both factors play a part.

S. L. C.

FILHO (Moncorvo). **Defeza social contra a tuberculose infantil.**—*Brazil Medico.* 1921. Oct. 22. Year 35. Vol. 2. No. 15. pp. 212–217.

The author takes the view, already expressed by numerous workers of whom he quotes some of the more prominent, that the most effective time for the prevention of tuberculosis is during childhood. He shows how small is the part played by heredity in the transmission of the disease and lays stress upon the great danger of infection in the earlier years of life. In quoting the views of F. C. SMITH, of the United States Public Health Service, as to the measures to be recommended, amongst which are included the protection of infants and young children from infection, the care of the general health as a factor in general resistance, the special instruction of doctors and the education of the public with regard to this disease, he adds that our measures of prophylaxis must commence with the better care of the expectant mother and must be effective from the first days of infancy until the age of 20 years at least. All this is very true, and the paper should be read in the original by those about to organize measures for the prevention of tuberculosis; but only a short notice can be given here, as the bearing of the communication upon the problems of tuberculosis in the tropics is but slight.

S. L. C.

HECK (Maurice E.). **Results of the Recent Antituberculosis Campaign in Panama.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Pt. 1. pp. 110–118.

This short paper shows clearly what can be done, even under the most difficult conditions and dealing with a population which includes many highly susceptible persons of tropical origin, by a carefully planned and thoroughly organized antituberculosis campaign. Panama has had a tuberculosis death-rate varying from 410·13 per 100,000 in 1910 to 521·41 per 100,000 in 1917; a record which speaks for itself. The author, on his appointment as Health Officer of Panama on August 29, 1917, at once started to investigate the existing statistics, improve notifications, apply the health regulations and improve housing conditions. It was ascertained that nearly all the deaths from tuberculosis were occurring in the families of labourers who occupied but one room; and that these rooms were dark, damp, dirty and ill-ventilated.

The city was taken section by section, "securing improvements in all houses in sections so covered before going on to a new section."

Property owners were circularized to make the necessary improvements in their property, but without result; but a reminder of a more threatening kind had the desired effect. The preliminary results are as follows:—

	Number.	*Mortality per 100,000.*	*Monthly Average.*
Deaths from Tuberculosis:			
First five months of 1917	131	524	26·20
First five months of 1918	94	376	18·80

This is a good record and speaks well for the future prospects of the work in Panama.

S. L. C.

SCOTT (Z. T.). **Some Phases of the Negro Tuberculosis Problem in Texas.**—*Texas State Jl. Med.* 1921. July. Vol. 17. No. 3. pp. 164–167.

The title of the paper raises hopes that it may afford information as to the incidence and mortality from tuberculosis amongst the negro population of Texas. The statistical part is, however, vague and unreliable, and it is clear that the author has had access to no records of a satisfactory kind. One phrase only is to be found as to clinical type:—"My experience has taught me that the negro with tuberculosis usually dies very quickly as compared with the white."

S. L. C.

CORNICK (Boyd). **The Question of Climate for Tuberculosis.**—*Texas State Jl. Med.* 1921. July. Vol. 17. No. 3. pp. 161–164.

This paper deals in general terms with the great curative effect of the climate—or certain samples of the climate—of Texas in tuberculosis. This beneficial effect he attributed to "sun-dried air." The recent observations of ROLLIER in Leysin and the work of Leonard HILL as to the value of the sun's rays in tuberculosis makes it probable that such a climate as that of Texas is likely to prove valuable for cases of this kind; but the present paper gives us no evidence of this apart from the expression of a strong personal opinion. Carefully controlled observations in such a climate would be of great interest.

S. L. C.

IYENGAR (K. R. K.). **Studies in the Value of the Wassermann Test, No. IV. Significance and Value of a Positive Wassermann Reaction in Tuberculosis.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 369–370.

In this short paper, observations upon the sera of 70 patients suffering from pulmonary (40), glandular (14) and abdominal (16) cases of tuberculosis were carried out with a view to deciding whether infection with tuberculosis in itself was capable of introducing a factor of error in the reading of Wassermann tests for syphilis.

Of the 40 pulmonary cases, 8 were positive, of whom 3 gave a recent history of syphilis; of the 14 cases with tuberculosis of glands, 3 were positive; and 3 gave a positive reaction amongst the 16 abdominal cases.

In his previous Report (Study No. 1, *Indian Jl. Med. Res.*, Vol. 7, No. 2) the author had shown that in 400 healthy Indian male adults, 88, or 22 per cent., gave a positive Wassermann reaction, and he therefore concludes that the 20 per cent. now recorded in an unselected population infected with tuberculosis must be due to latent or clinically inactive syphilis.

He is therefore in a position to state that tuberculosis is not a cause of positive Wassermann reaction.

S. L. C.

REMLINGER (P.). **Essais de traitement de la tuberculose expérimentale du cobaye par les injections sous-cutanées de crachats tuberculeux stérilisés à 100 degrés.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 422–427.

This paper deals with experiments to ascertain whether the sputum of tuberculous patients, heated to 100° C. for five minutes so as to kill the bacilli, would prove of any value as a vaccine either for the cure or the prevention of experimental tuberculosis in the guinea-pig. Suffice it to say that in six experiments in the *cure* of already infected animals, the periods of survival after infection for all the treated animals amounted to a total of 649 days, while the periods for the untreated group came to a total of 653 days; in other words, the vaccine had no effect, good or bad.

Its use as a "prophylatic" was even less encouraging, the "protected" animals dying sooner than the "unprotected." The work is published to spare other investigators from this negative field of research.

S. L. C.

BERIBERI.

W[ALSHE] (F. M. R.). **Some Recent Observations on the Nervous Lesion in Experimentally Produced Avian Polyneuritis (Experimental Beriberi).**—*Med. Sci. Abst. & Rev.* 1922. Jan. Vol. 5. No. 4. pp. 314–319.

In this study of the etiology of beriberi the author again insists upon the importance of co-ordinating the neuropathological findings with the clinical symptoms, and the dangers of judging the human disease from a too restricted study of birds, and of a too narrow biochemical view. He believes with FINDLAY that disorder of carbohydrate metabolism is an essential factor and that a poison is formed in the body, producing degeneration of nerve cells and nerve fibres, but he disagrees with FINDLAY when he regards the chromatolysis of the former as a sign of nuclear insufficiency and starvation, or states that the subsequent paralysis depends upon nuclear starvation. FINDLAY holds that there is an enlargement of the cortex of the suprarenals from an increased storage of phosphorized lipoids, which are essential for the synthesis of nucleic acid, and these stored lipoids can only be used by the nucleus in the presence of vitamin B ; when the latter falls below normal the lipoids are immobilized in the adrenals instead of being passed on to the nervous system, which system then begins to run short of nuclear material and paralysis follows, or if the shortage is acute, death. This ingenious theory is not, according to the author, supported by pathological evidence, for we cannot say that chromatolysis indicates nuclear starvation, or that it can give rise to paralysis, and KELLAWAY has shown that the storage of phosphorized lipoids is not proven.

In acute beriberi, as in all other forms of toxic neuritis, the clinical symptoms may precede any pathological changes which are discoverable in the nerves post-mortem, but the proportion of damaged fibres found need not represent the total number of fibres out of action, and there is no necessity, as thought by VEDDER, FINDLAY, and MCCARRISON, to believe that the essential lesion must be in the nerve cells. Chromatolysis of cells appears much more rapidly than nerve degenerations, and therefore can be earlier demonstrated. The author wishes to reconcile the new theory of causation with the old clinical and pathological conception of the disease, viz., that of a toxic *positive* factor produced in the body through a dietetic deficiency.

[With regard to the early changes in the nerves which are not appreciable to the neuropathologist, the work of KATO, SHIZUMI, and MAKI (see below) on the delayed transmission of impulses along the affected nerves should be considered and received as very definite evidence.]

P. W. Bassett-Smith.

BOYD (J. E. M.). **Notes on Several Cases of Beriberi occurring amongst British Troops during and after a Voyage from India to France.** —*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 303–306.

The author describes how two battalions of British troops were sent from Karachi to Marseilles in a ship which was very badly overcrowded with 2,000 men, horses, mules, cattle, and 400 sheep. The ship left India on August 29, and the voyage took one month, but it was broken by four days in Egypt, when the men trained from Suez to Alexandria; 23 cases were noted with symptoms of weakness of the legs, hyperaesthesia of the calf-muscles, some oedema of legs and rarely of the face, areas of anaesthesia, and loss of knee jerks; only one case showed cardiac signs. These cases were not considered to be true beriberi, and were returned as neuritis. On disembarking at Marseilles, 12 of the Manchesters and 25 of the Connaught Rangers were sent to hospital and were recognized as suffering from beriberi. Both battalions had been in the Punjab before embarking, and neither they nor the ship's company had shown previous cases of beriberi. The food is said to have been good, but the overcrowding and unsanitary condition of the ship were definite epidemiological facts.

P. W. B-S.

JOUVEAU-DUBREUIL (H.). **Le béribéri au Setchouan (Chine).**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 666–685.

Beriberi has been known among the Chinese since the seventh century and is called "Kio K'i," meaning vapour or humidity of the feet. Since the opening of the hospital in Tchentou, cases have always been present; it has also occurred in an epidemic form among the population, chiefly where people are gathered together in camps, forts, schools, prisons, etc., most commonly in low lying areas. Generally speaking, the food, housing, and hygienic conditions were good in those places where the disease was endemic, and the author could find no support for food deficiency. He states that the rice used is home grown, roughly milled, and only partly decorticated; 97 cases were treated in the hospital during 1918–19. Of these 92 were soldiers, 3 were students, and 2 were civilians; 91 are described as being slight (*rudimentaires*), 1 atrophic, and 3 wet. The figures are not large and the cases were mostly drawn from one particular group, so that the deductions are not of much value.

P. W. B-S.

TUPAS (A. V.). [**Cases of Infantile Beriberi admitted to Philippine General Hospital during Year 1920.**]—*Jl. of the Philippine Islands Med. Assoc.* Manila. 1921. May–June. Vol. 1. No. 3. p. 108. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Nov. 12. Vol. 77. No. 20. p. 1603.]

Of 36 cases of infantile beriberi admitted to hospital, 30 were under three months of age and 11 died. X-rays were used in 16, 14 of whom had an enlargement of the heart to the right, and two to the left. Post-mortem in five of the fatal cases there were constant lesions, hydropericardium, punctate haemorrhages of the lungs, passive congestion of liver, spleen and kidneys, degenerative neuritis of the vagus and dilatation of the heart, the right ventricle being three times the size of the left.

P. W. B-S.

SPRAWSON (C. A.). **The Heart in Beriberi and the Evidence of the Differential Stethoscope.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 625–629.

In Mesopotamia thousands of Chinese were employed and hundreds suffered from beriberi, mostly in a latent form; of these 62 were carefully investigated. Knee reflexes were present in 27, increased in 18, and absent in 17. Anaesthesia was present in 42, marked in 8, absent in 8. In 42 there was no deep tenderness of the calf muscles, but it was definite in 14. In 14 there was no oedema, in 18 it was present and in 8 it was very marked. The average pulse rate lying down was 84, the limits being 52–126. In 32 there were abnormal cardiac signs, mostly dilatation of the right side. The use of Leyton's stethoscope in 55 cases showed that beriberi cases exhibited evidence of myocardial degeneration, the ratio of the intensity of the apex and aortic sounds being 1·6 in beriberi to 2·0 in healthy Chinese. A short description of the stethoscope and its use is given.

P. W. B-S.

SHINKAI (Kinjiro). **[On the Quantitative Estimation of Urea and Amino-nitrogen in the Blood and Urine of the Patient of Beriberi.]**—*Nihon Naika Gakkwai Zasshi* (*Jl. Jap. Soc. Intern. Med.*). 1921. Feb. Vol. 8. No. 11. [Summarized in *Japan Med. World*. Tokyo. 1921. June 20. Vol. 1. No. 2. p. 21.]

In about 50 per cent. of acute cases of beriberi an increase of amino-nitrogen was found in the blood or urine, but never in both fluids at the same time. At present no pathological importance can be attached to this.

P. W. B-S.

WELLS (A. H.). **The Preparation of Tikitiki Extract for the Treatment of Beriberi.**—*Philippine Jl. Sci.* 1921. July. Vol. 19. No. 1. pp. 67–73.

In the Philippines the removed pericarpal layer of the rice grain is called tikitiki, and is sold as cattle food for about two dollars per sack. VEDDER and WILLIAMS, and later, CHAMBERLAIN, showed how an extract curative for beriberi could be prepared from this. In 1913 the Bureau of Science commenced the manufacture and distribution of the extract on a large scale, and in 1916 the results had proved to be so good that it was determined to revise the method and increase the production; in that year 6,687 bottles of it were made. In 1918 the number had risen to 8,188, but had not caught up the demand. The present method of preparation is as follows:—Polishings from freshly milled rice, preferably of a new crop, clean and finely ground, are extracted for 48 hours in a solution of 25 per cent. alcohol by weight. The proportion of tikitiki to alcohol is 1–2. The mixture is agitated and decanted, and the residuum passed to a press. The combined extracts then go to a distillation plant and are evaporated under a pressure of 1 cm. with a maximum temperature of 75° C., the alcohol distilled over being passed back to the extraction plant. The syrup-like fluid is clarified and freed from inactive substances by treatment with ethyl alcohol, centrifuged, and concentrated to a density of 1·32, again centrifuged, and separated. The finished product is then heated to 65° C., bottled, pasteurized for three successive days at 62° C. labelled, lacquered and distributed. The extract does not come in contact with metal except in two of the stills, which are tin lined; one still is glass enamelled. The precipitation, cooling, and storage are done in glass or porcelain vessels. One mil. of this extract represents the active constituents of 20 gm. of rice polishings. There are two grades of tikitiki, one from white rice and one from dark or red rice; the latter does not at present give satisfactory results. The Public Welfare Board require 10,000 bottles of this extract monthly. Extracts prepared by local druggists are generally defective; their supply indicates the prevalence of the disease in the locality. It is pointed out that although 10,870 bottles were issued in 1920, a larger government production is required to reduce still further the infant mortality.

P. W. B-S.

HOFMEISTER (Franz). **Studien ueber qualitative Unterernährung. I. Mitteilung. Die Rattenberiberi.** [Studies on Qualitative Undernourishment. Part I. Rat Beriberi.]—*Klin. Woch.* 1922. Mar. 11. Vol. 1. No. 11. pp. 522–523.

The experiments show that on a vitamin B free diet, rats first develop ataxic symptoms and clonic spasms, and finally become paralysed, symptoms which indicate early disturbances of the central nervous system. This view is confirmed by the anatomical findings of Dr. KILN, who constantly found in all typical beriberi animals multiple haemorrhages at the base of the brain and in the cerebellum, with degeneration of the nerve elements in the same parts, these lesions corresponding with the nerve disturbances found during life. On the other hand the degeneration of the peripheral nerves was slight or absent, even in pronounced cases. These pathological findings point to a haemorrhagic encephalitis similar to that found in chronic poisoning by arsenic, lead, and alcohol, rather than to a polyneuritis. He thinks that the site of the lesions shows where the under-nourishment of the nervous system has been most marked. These lesions apparently vary in different animals; in man and fowls the peripheral nerves suffer first and most heavily, while in rats and pigeons it is the central nervous system.

The relationship to chronic poisoning is close, and it shows that under-nourishment (namely vitamin B starvation) and chronic poisoning, although different in cause, lead to similar disturbances in the co-ordination of the cellular processes, and finally to the same anatomical pathological changes.

[This means that in his opinion beriberi is caused by some toxic poison].

P. W. B-S.

UJIHARA (Kinichi) & ROKKAKU (Takawo). **[A Study of Beriberi, in Special Reference to Fermentation.]**—*Nippon Shokakibyo Gakkwai Zasshi (Japan Jl. Gastro-Enterology.)* 1921. July. Vol. 20. No. 4. [Summarized in *Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. p. 18.]

The author, from his studies on experimental rice disease of birds, arrived at the following deductions:—(1) There were marked disorders of pancreatic function. (2) Decrease of the body content of diastase.

(3) Increase of auto- and heterolysis of the liver and also lysis of the body albumen, owing to the quantitative decrease of the trypsin content of the blood; and also by the supply of the deficient diastase, the disease could not be checked.

P. W. B-S.

KAWAKAMI (Zen). **[Physiological and Pathological Study on the Nerves of the Bird suffering from Polished Rice Disease. Pathological Study.]**—*Keio Igaku* (*Keio Med. Jl.*). 1921. Mar. Vol. 1. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1921. Aug. 15. Vol. 1. No. 4. p. 12.]

The nerves of birds which had died from starvation showed no differences from those of normal birds, but distinct changes were seen in birds that had been fed upon polished rice. The microscopical changes in the latter always had the same characters, but even if these were similar in degree the functional changes observed might differ.

P. W. B-S.

KATO (Gen-i-chi), SHIZUME (S.) & MAKI (R.). **On the Nature of Paralysis due to Polished Rice Disease in Domestic Fowls.** (An Abstract from the Paper read before the Meeting of the Kakke-Beriberi-Investigation Committee, on March 9, 1920.)—*Kitasato Arch. Experim. Med.* 1921. Vol. 4. No. 3. pp. 207–216.

In continuation of their experiments on birds, it was shown by the authors that the velocity of the impulse along the nerves of fowls suffering from paralysis due to the use of polished rice was much less than normal, and could be restored to the normal rate after cure of the paralysis by the use of bran extract. They found also that though the majority of the nerve fibres were again rendered normal, the conductivity of a few might indicate no sign of recovery and remain destroyed. They argued that if the hydrogen ions are the cause of the paralysis in bird beriberi, paralysis caused experimentally by hydrogen ions must be curable by rice bran extract; this they proved to be the case, using frogs and toads as experimental animals. The extract restores the function of the nerves by displacing the absorbed hydrogen ions; it is, however, rather harmful to normal nerves. The extract is said to lessen in a remarkable way the surface tension of a solution so that it will be strongly adsorbed, and so displace the hydrogen ions. "Oryzanin," the commercial product, acted like the laboratory extract. The extract had no curative effect on the paralysis caused by cocaine, chloral hydrate, or urethane. By experiments on the sciatic nerves removed from paralysed fowls, the concentration of the hydrogen ions was found to be 5 to 10 times more than that of normal nerves; an increase was also found in the spinal cord. The results with pigeons were similar to those obtained with fowls. From further experiments they conclude that the diseased nerves of fowls have an increased power of absorbing hydrogen ions and a decreased power to adsorb hydroxyl ions, compared with healthy nerves. Microscopically the condition of the nerves paralysed experimentally with hydrogen ions was similar to that found in the nerves of fowls with rice-caused beriberi. [For summary of a similar paper of these authors, see this *Bulletin*, Vol. 19, p. 75.]

P. W. B-S.

TAKAHIRA (Hidewo). **[On the Hydrogen-ion Concentration of the Extracts of the Heart and the Blood Vessels of the Bird suffering from Polished Rice Disease.]**—*Keio Igaku* (*Keio Med. Jl.*). 1921. Oct. Vol. 1. No. 10. [Summarized in *Japan Med. World*, Tokyo. 1922. Feb. 15. Vol. 2. No. 2. p. 50.]

Analysis of the Hydrogen-ion concentration of the heart and blood vessels of birds suffering from polished rice disease showed it to be higher than that of the controls, its level varying with the degree of the pathological lesion.

P. W. B-S.

NI (Tsang G.). **Beriberi : Some Facts and the Possible Hypothesis.**—*Jl. Lab. & Clin. Med.* 1922. Mar. Vol. 7. No. 6. pp. 340–348.

This is a controversial and theoretical discussion, and contains no new facts. A disturbance of vitamin metabolism is looked upon as one, if not the only, factor in causing beriberi, the infectious and nitrogen starvation theories being discarded.

P. W. B-S.

WRIGHT (Samson). **The Effect of B-Vitamin on the Appetite.**—*Lancet.* 1921. Dec. 10. pp. 1208–1209. With 1 chart.

COWGILL (George R.). **A Contribution to the Study of the Relationship between Vitamin-B and the Food Intake in the Dog.**—*Proc. Soc. Experim. Biol. & Med.* 1921. May. Vol. 18. No. 8. pp. 290–291.

DAMIANOVICH (H.). **Quelques recherches sur la Vitamine B.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 591–592.

Wright summarizes his paper as follows :—

> "Vitamine B acts by facilitating the efficient carrying out of the functions of the intestinal canal. The main effects produced by the absence of the vitamin—*i.e.*, diminished food consumption, loss of weight, and ultimate death—are due to intestinal stasis and the absorption of toxic bodies which results therefrom."

Cowgill also brings forward evidence to show that vitamin B increases the appetite in dogs. Damianovich considers that this vitamin accelerates diastatic processes and especially the synthesis of nucleins.

A. D. Bigland.

i. DE WYSS (W. H.), ii. WRIGHT (Samson), iii. HESS (W. R.). **B-Vitamin and Pigeon Beriberi.** [Correspondence.]—*Lancet.* 1922. Jan. 14. pp. 100–101 ; Feb. 11. p. 297 ; Mar. 18. p. 554.

i. It is stated that the view held by Samson WRIGHT, that beriberi symptoms are caused by the absorption from the intestinal canal of toxic bodies produced by stasis, due to the absence of vitamin B, has been contradicted by ABDERHALDEN and EWALD as well as by MESSERLI, Experiments carried out by W. R. HESS on pigeons at Zurich, and here shortly reported by DE WYSS, proved that there was an inhibition of oxidation processes in the tissues of birds suffering from vitamin B deficiency, and that, vice versa, symptoms of avian beriberi could be produced by injecting substances known to inhibit such processes ; therefore the B deficiency consists in an inhibition of the oxidative power, and the B vitamin furnishes the structural basis of the oxidative ferments of the body. It is not claimed that B vitamin deficiency injures the whole chain of oxidative processes, probably only one of them, but this may lead on to the destruction of others. The view that the whole syndrome is due to the absence of a catalytic agent explains how the administration of traces of B vitamin are sufficient to counteract the symptoms. No details are given with regard to the experiments and the controls used ; these will appear in the full paper by HESS.

ii. The view held by DE WYSS is not accepted by the writer, and is not in conformity with his own experiments. He points out that the diminution in the oxidative powers of the tissues is rather due to an intoxication which is secondary to intestinal stasis produced by the absence of the vitamin from the diet.

iii. A reply to Dr. Samson WRIGHT, who, the author states, does not accept the evidence of his experiments. All the symptoms of B vitamin deficiency, he considers, are due to a loss of the oxidative power of the tissues, the insufficiency of the alimentary tract being only a part of the general insufficiency. There are two phases of the oxidative process in the cell—(*a*) reduction of carbohydrate to lactic acid ; (*b*) oxidative removal of the lactic acid formed. The experiments of MESSERLI seem conclusive against the intoxication theory of Samson WRIGHT.

P. W. B-S.

SIMMONNET (H.). **Alimentation artificielle chez le pigeon. Régime complet d'équilibre nutritif carencé en facteur B.**—*Bull. Soc. de Chimie. Biol.* 1921. Dec. Vol. 3. No. 10. pp. 583–612. With 11 charts.

In this paper the author describes a method of studying avian polyneuritis which, he claims, has several advantages over the methods generally employed.

In the first place the pigeons are kept upon a diet which maintains them in equilibrium but in such form that they are on the threshold of starvation. In this way the suppression of the active factor in a very short time leads to polyneuritis. The diet is as follows :—

Residu de viande	11 gm.
Melange salin	4 gm.
Agar pulvérisé	5 gm.
Huile d'arachides	5 gm.
Cellulose	5 gm.
Fécule de pommes de terre ..	60 gm.
Beurre..	10 gm.

Apparently this diet is sufficient to keep birds alive for long periods (in certain cases for over a year). Factor *B* was obtained from " Levure de bière sèche Byla " : (1) by extraction with alcohol at 70° C. ; (2) by extraction in the cold. The latter was somewhat the more potent.

Birds kept upon the above diet with the extract added for 90–100 days show premonitory polyneuritic symptoms within two to five days of stopping the extract. On the other hand, birds fed on ordinary diet and then deprived of factor *B* do not exhibit nervous symptoms until 30–40 days have elapsed. The advantages claimed for this method are : (1) that the number of starvations to which the animal is subjected is reduced to a minimum. Also it is pointed out that if polyneuritis be due only to inanition then it is important to reduce the number of substances upon which this inanition depends ; (2) that the animals are on the threshold of starvation always, while maintaining outwardly physiological equilibrium.

With animals thus fed the author has studied the curative and preventive properties of various extracts of brewer's yeast. The histories of the animals are given in considerable detail.

A. D. B.

MATHEU (C. Pillado). **Recherches cliniques sur la vitamine B.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. p. 593.

ACUNA (M.) & GARRAHAM (J. P.). **Resultats cliniques de l'emploi de la vitamine B.**—*C.R. Soc. Biol.* 1921. Dec. 17. Vol. 85. No. 37. pp. 1218–1219.

Sick infants were given extracts rich in vitamin B, but no definite benefit was reported by Acuna and Garraham. On the other hand Matheu has been able to show good results on these lines, the children gaining in weight and showing an increase in red blood corpuscles.

A. D. B.

COWGILL (George R.). **Studies in the Physiology of Vitamins. II. Does Vitamin-B Stimulate Glands in a Manner similar to the Alkaloid Pilocarpine?**—*Proc. Soc. Experim. Biol. & Med.* 1921. May. Vol. 18. No. 8. p. 290.

FUNK (Casimir) & DUBIN (Harry E.). **The Vitamines of Yeast and their Rôle in Animal Nutrition.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Oct. Vol. 19. No. 1. pp. 15–16.

PAEZ (Félix R.). **Relación sobre el beriberi. Presentada al Tercer Congreso Venezolano de Medicina.**—*Gac. Méd. de Carácas.* 1921. July 31. Vol. 28. No. 14. pp. 211–217.

SANTOS (Francisco O.). **Some Plant Sources of Vitamins B and C.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Oct. Vol. 19. No. 1. pp. 2–3.

STAMMERS (Arthur Dighton). **LVII. Feeding Experiments in Connection with Vitamins A and B: (I) The Value of Steam-Distilled Palm Kernel Oil as a Control Fat. (II) Wheat Bran as a Source of Vitamins A and B.**—*Biochemical Jl.* 1921. Vol. 15. No. 4. pp. 489–493. With 2 figs.

SCURVY.

DONALDSON. [**Scurvy: Demonstration.**]—*Proc. Transvaal Mine Med. Officers' Assoc.* 1921. Dec. Vol. 1. No. 9. pp. 1–10. With 4 text figs.

A practical demonstration was given of the intravenous administration of orange juice for the treatment of scurvy. From 15–35 cc. of strained juice neutralized with NaH and generally made up to 60 cc. with sterile saline had been injected every third day. The larger dose might cause vomiting and pain; 15–20 cc. was generally sufficient. This method of treatment was found to be far more efficacious and rapid than when the juice was given by the mouth, but the number of cases so treated was not large, about one dozen. It would appear that the oranges must be fresh and the juice recently expressed. There was no sterilization by boiling.

P. W. Bassett-Smith.

SQUAIR (J.). **Champlain's Reference to Scurvy.**—*Canadian Practitioner & Review.* 1921. Sept. Vol. 55. No. 9. pp. 271–273.

The records date back to 1604, when the disease was called "Le mal de la terre." It caused a great morbidity and mortality, in one instance 35 deaths in 79 cases. Its characters, which are well described, include subcutaneous, mucous, and intramuscular haemorrhages. The disease was attributed to the salt meat ration. Natives who changed their diet of fresh meat to the salt meat also died. The most interesting point in the paper is the description given of the origin and use of a decoction of spruce leaves and tops as a curative agent. The plant was called "aneda," which was the name of an Indian chief by whom it was probably introduced.

P. W. B-S.

VEDDER (Edward B.). **The Etiology of Scurvy.**—*Milit. Surgeon.* 1921. Nov. Vol. 49. No. 5. pp. 502–512. With 8 charts.

The object of the experiments here recorded was to determine if the removal of the acids from orange juice, etc., was detrimental or otherwise to its antiscorbutic power. The method of preparing the different juices and the effects on guinea-pigs are fully described, and are summarized as follows:—

1. The antiscorbutic vitaliment is neither an acid nor the salt of an acid, since an extract from which all the acids and salts have been removed both prevents and cures cases.

2. The antiscorbutic vitaliment may be stored without impairment for at least several months in neutral aqueous solution.

3. When orange or lemon juice is neutralized and diluted with alcohol it retains the antiscorbutic vitaliment if used immediately, but this is destroyed if the solution is stored.

4. When orange juice is extracted with alcohol, acetone neutralized, and the soluble part stored in alcohol, the solution cures and prevents scurvy but does not produce normal growth. The vitaliment is altered but not entirely destroyed.

5. A similar result is obtained when orange juice is extracted with alcohol, acetone neutralized, and the dry residue extracted with ethyl acetate.

It would appear that a chemical change takes place, or that both a scurvy and a growth vitaliment are present, and the amount of activity depends on the solvent used.

The antiscorbutic vitaliment is apparently an active reducing agent, it decolorizes Pot. permang., and aqueous solution of fuchsin, and is rendered inactive by hydrogen peroxide, sulphuric acid, and alkaline hydroxides. It therefore has a strong affinity for oxygen and loses its physiological action when it becomes oxidized.

P. W. B-S.

DELF (E. Marion). **Studies in Experimental Scurvy, with Special Reference to the Antiscorbutic Properties of some South African Foodstuffs.**—*Lancet.* 1922. Mar. 25. pp. 576–579.

The author describes cases seen in the Rand mines which indicate that starvation is a contributory cause of scurvy; she also notes that owing to recent legislation the cases have been greatly reduced in number but that latent scurvy is still occasionally epidemic. Experiments as to the antiscorbutic value of different foods gave the following results :—

Food.	*Relative value.*	*Food.*	*Relative value.*
Fresh peach ..	50–80	Vegetable marrow	33
Pineapple ..	44	Pumpkin ..	5
Orange	100	Sweet potato ..	31
Naartje (Tangerine Orange).. ..	80	Sugar Cane ..	0
Pawpaw	40		

It was found that 2–5 gm. of germinating peas were sufficient to protect a guinea-pig for at least 90 days, whereas soya beans had no such power because in germinating they store oil and not starch. The germinating peas should simmer in a double steamer, plus the addition of a little alkali, and the liquor should be used as well as the peas. Kaffir beer was found to have little, if any antiscorbutic value. For curative experiments orange juice was the most valuable antiscorbutic; tomato juice had little appreciable value and pawpaw acted best in severe scurvy associated with dysentery.

P. W. B-S.

ECKMAN (Philip F.). **The Antiscorbutic Value of Dehydrated Fruits.** —*Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. pp. 635–636. With 2 text figs.

When a quantity of 2–4 gm. respectively of dried apricots, peaches, apples, plums, prunes, cherries, or logan berries was added daily to a basal antiscorbutic-free diet it was found that 4 gm. of peaches was the only fruit able to delay the onset of scurvy in guinea-pigs for 3–4 months ; the apricots and apples had very slight value, if any.

P. W. B-S.

Givens (Maurice H.), McClugage (H. B.) & van Horne (E. G.). **The Antiscorbutic Property of Fruits. II. An Experimental Study of Apples and Bananas.**—*Amer. Jl. of Diseases of Children.* 1922. Mar. Vol. 23. No. 3. pp. 210–225. With 13 charts in text.

A large number of experiments were carried out on guinea-pigs to determine the value of fresh and dried apples and bananas as antiscorbutic foods. These demonstrated that raw apples and raw bananas are antiscorbutic ; if either were subjected to heating, as in ordinary canning or desiccation, the antiscorbutic vitamin was materially diminished, and the fruits must be then considered as unreliable sources of the vitamin. All the dried products were used within two and a half months after dehydration. The question of the maturity of the fruit has also to be taken into consideration, whether fully ripe or not. It was found that dried apple peelings were a better antiscorbutic agent than the dried apples, which would seem to indicate that the vitamin is associated with the cells, as there are more cells in the peeling than in the body of the apple ; however, it is possible that the cellulose covering the apple peeling may have acted as a protective agent against the destructive influence of the heat in dehydrating.

P. W. B-S.

Smith (Clarence A.), Bergeim (Olaf) & Hawk (Phillip B.). **The Antiscorbutic Potency of Strawberries.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Vol. 19. No. 1. p. 22.

Guinea-pigs suffering from experimental scurvy were cured in seven days by the addition to their ration of 10 cc. of the juice of strawberries, either fresh, or boiled for five minutes. No details are given.

P. W. B-S.

i. Bezssonoff (N.). **Du principe antiscorbutique dans le jus de pomme de terre extrait en présence d'acides.**—*C.R. Acad. Sci.* 1921. Aug. 22. Vol. 173. No. 8. pp. 417–419.

ii. ——. **Sur une réaction colorée commune aux extraits antiscorbutiques et à l'hydroquinone.**— *Ibid.* Sept. 5. Vol. 173. No. 10. pp. 466–468.

i. In previous experiments the author found that raw potato had a strong antiscorbutic action but that the juice expressed by pressure had little ; if, however, the juice was collected from pounded potato it possessed to a large extent the antiscorbutic properties. This made him believe that the instability of the antiscorbutic principle was due in great part to the action of an enzyme, particularly that of an oxydase. Bertrand showed in 1907 that different acids, including citric and tartaric acids, used in very dilute strengths, were able to paralyse completely the action of the oxydase. The author found that the potato juice extracted in the presence of small quantities of either citric or tartaric acids gave slightly better protection to guinea-pigs than the juice extracted without acid ; the animals lived longer but generally developed scurvy signs at last.

ii. The author describes a colour test for vitamin C, which is a modification of the Folin-Denis phenol reaction (1912–15). The colour is slate-grey to blue in the case of antiscorbutic fluids, and is not shown with extracts of grains and other substances known to be inactive. It is stated that the test will detect the destruction of vitamin C in a fluid normally rich, such as in boiled orange juice. The blue colour is shown in potato juice extracted in the presence of acid but not in that extracted without, the latter being only feebly antiscorbutic.

The author says " It is possible to suppose that the reaction is not due to the antiscorbutic substance, or at least not to this alone, but to an unstable radicle, probably a polyphenol, which in the solution detaches itself easily from the vitamin C." The monophenols, salicylic acid and tyrosine, do not give the reaction, but a diphenol, hydroquinone, gives the same blue reaction as that given by fluids containing vitamin C.

P. W. B-S.

DUTCHER (R. Adams), HARSHAW (H. M.) & HALL (J. S.). **Vitamine Studies. VIII. The Effect of Heat and Oxidation upon the Antiscorbutic Vitamine.**—*Jl. Biol. Chem.* 1921. Aug. Vol. 47. No. 3. pp. 483–488. With 3 charts in text.

Guinea-pigs were used for the experiments and were divided into six groups, four in each. They received the usual basal diet and 3 cc. of raw orange juice daily. The following is a summary of the results obtained :—

" 1. The antiscorbutic vitamin is not destroyed by heating at Pasteurization temperature (to 63° C.) for 30 minutes, in closed vessels, or by boiling (at 100° C.) for 30 minutes, under reflux condensers.

" 2. Hydrogen peroxide possesses some destructive action when added to orange juice at room temperature, and the destructive action is increased when the orange juice hydrogen peroxide mixture is heated at 63° and 100° C.

" 3. The antiscorbutic properties of orange juice are susceptible to oxidation, but, in the absence of oxidizing agents, are stable to heat up to the boiling temperature of orange juice."

[In ZILVA's experiments with boiled lemon juice in an atmosphere of CO_2 the antiscorbutic property was not destroyed (see this *Bulletin*, Vol. 18, p. 60).]

P. W. B-S.

EDDY (Walter H.), SHELOW (E.) & PEASE (R. A.). **The Effect of Cooking upon the Antiscorbutic Vitamin in Cabbage.**—*Proc. Soc. Experim. Biol. & Med.* 1922. Jan. 18. Vol. 19. No. 4. pp. 155–160. With 2 figs.

A series of experiments on guinea-pigs showed that ten times the protective amount of fresh cabbage was inadequate to protect from scurvy when the cabbage had been boiled in ordinary cooking, and that the vitamin seemed to be less resistant than that of orange or tomato juice. The authors agree with ELLIS, STEENBOCK & HART that desiccation of cabbage in CO_2 at 65° C. was very destructive of the antiscorbutic factor. It was also observed that, with the maximum ration, there was no difference in the amount of destruction of the C vitamin when the cabbage was cooked in an open kettle or in the pressure cooker. A rather poor plate is given showing the changes found in the costo-chondral junctions of the ribs of treated rats.

P. W. B-S.

HESS (Alfred F.) & UNGER (Lester J.). **The Destruction of the Antiscorbutic Vitamin in Milk by the Catalytic Action of Minute Amounts of Copper.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Dec. 14. Vol. 19. No. 3. pp. 119–120.

As oxidation has been proved to destroy the antiscorbutic vitamin, it was thought that certain catalysts, such as copper, might act in increasing the oxidative process. Three groups of guinea-pigs were used, with a basic diet and diluted dry milk.

1. The milk was heated in a glass vessel at 60° C. for 40 minutes: none of the animals developed scurvy in four months.
2. The milk was heated to the same degree in a copper vessel: all developed the disease and died after about four weeks.
3. The same as No. 2, but each animal received daily 2 cc. of orange juice: all remained healthy. The antiscorbutic factor, therefore, must have been removed in No. 2. As milk frequently shows evidence of copper after commercial pasteurization or condensation, this may explain in some degree the varying results obtained with heated milk; the copper content in the milk may also exert a deleterious action, especially in infants, an important practical point to be remembered.

P. W. B-S.

HERZOG (F.). **Ueber experimentellen Skorbut bei Meerschweinchen.**—*Frankfurter Ztschr. f. Path.* 1921. Vol. 26. No. 1. pp. 50–79. With 2 text figs.

The author points out that HOLST and FRÖLICH were the first to make observations on scurvy in guinea-pigs, and noted the resemblance to BARLOW's disease and infant scurvy; dogs and pigs also had the same disease. The author experimented with five guinea-pigs, and gives in minute detail the blood changes before death, and the pathological conditions after. He appears to consider that the disorganization of the blood-producing organs and the changes in the bone marrow cannot be taken as the reason for the haemorrhagic diathesis and the anaemia of scurvy, which are probably due to changes in the walls of the blood-vessels themselves. The Röntgen ray examinations showed the same typical changes which have been described by FRANKELL; the distinct dark band was clearly visible near the bone cartilage junction. The histological changes in the costo-chondral junctions are well shown in the two figures.

P. W. B-S.

MOURIQUAND (G.) & MICHEL (P.). **Le scorbut jugé par l'expérimentation.**—*Paris Méd.* 1921. May 7. Vol. 11. No. 19. pp. 366–373.

The authors review the experimental work to determine the etiological factors of scurvy. They naturally give an unconscious preponderance to the theories that they have advanced and the experiments which support them, but these are of great importance and are the result of long and close enquiry. They have, however, no new facts to record. For the deficiency factors the term "minimal substances" is used; these may act as ferments, catalysers, or complement, and comprise not only vitamins, but amino-acids, certain salts, even certain hydrocarbons and carbohydrates, and also the important "eau vivante" of vegetable tissues.

P. W. B-S.

MOURIQUAND (Georges) & MICHEL (Paul). **Scorbut et acidose.**—*C. R. Soc. Biol.* 1921. Nov. 12. Vol. 85. No. 32. pp. 867–868.

It has been stated by MORGEN & BERGER that the addition of bicarbonate of soda to a scurvy diet prevents in rabbits the onset of the disease. FUNK confirmed this so far as rabbits were concerned, but with guinea-pigs there was no such effect. GLANZMANN, experimenting with guinea-pigs, added to the basal diets bicarbonate of soda, citrate of soda, lactate of calcium, and dry beer yeast, singly or together, and found with the first two a slight delay in the onset of the symptoms (100-150 days), but presence of acetone in the urine after death. The authors repeated their experiments, and demonstrated that scurvy in the guinea-pig is apparently not due to a condition of acidosis, and is not prevented by the administration of alkalies.

P. W. B-S.

BEDSON (S. Phillips). **The Blood Picture in Scurvy, with Particular Reference to the Platelet.**—*Brit. Med. Jl.* 1921. Nov. 12. pp. 792–793.

A diminution in the number of blood platelets is by many considered to indicate a tendency to haemorrhages, as shown by DUKE in 1910. In scurvy, WASSERMANN and KIRCH found that there was a reduction in the number; HESS and other American observers did not confirm this. The author has carefully investigated the blood changes in four cases of experimental scurvy in guinea-pigs and two in monkeys, none with any definite decrease in the blood plates, and in two human cases with haemorrhagic symptoms. The results were interesting: one case of true scurvy showed no marked change; in the other with purpura haemorrhagica the fall in the blood platelets was very remarkable. The technique used, which is given in detail, is no doubt a very important factor in obtaining reliable results. It is interesting to note that in the pre-scurvy stage the number of red cells is increased per cmm.; while in the acute stage, when haemorrhages are most marked, the numbers fall slightly below normal.

P. W. B-S.

PELLAGRA.

GOLDBERGER (Joseph) & TANNER (W. F.). **Amino-Acid Deficiency probably the Primary Etiological Factor in Pellagra.**—*Public Health Rep.* 1922. Mar. 3. Vol. 37. No. 9. pp. 462–486.

The authors summarize their work as follows :—

" The more important part of the evidence proving diet to be the primary controlling factor in the prevention and causation of pellagra is briefly summarized.

" Cases of pellagra are reported that were observed to occur in individuals who were known to have consumed daily, during periods of not less than two and one half months immediately before the onset of the distinctive eruption, what is judged to have been a liberal supply of mineral elements and the known vitamines, which would indicate that a deficiency of these dietary factors is not essential in the causation of the disease.

" These factors having thus been excluded, the dominating rôle of diet in the prevention and causation of pellagra must be referred primarily to the character of the protein (amino-acid) supply, this being the only other dietary factor at present known to be necessary to physiological well-being.

" On the assumption that all the dietary factors essential in human nutrition are known, it may be concluded that the essential etiological dietary factor is a specific defect in the amino-acid supply, probably in the nature of a deficiency of some special combination or combinations of amino-acids.

" There is reason to believe that besides the specific amino-acid defect, pellagra-producing diets may and probably frequently have other more or less serious faults including non-specific amino-acid deficiencies which may operate as accessory etiological factors.

" In some preliminary therapeutic trials with amino-acids the dermal lesions in each of two cases seemed to show a markedly favourable reaction to cystine ; and in a third case a steady gain in weight, with some improvement in diarrhoea, accompanied the administration of both cystine and tryptophane."

A. D. Bigland.

NICOLAS (J.), MASSIA (G.) & DUPASQUIER (D.). **Considérations étiologiques sur la pellagre avec 5 observations inédites.**—*Ann. de Dermat. et de Syph.* 1922. Jan. 6th Ser. Vol. 3. No. 1. pp. 1–23.

Five cases of pellagra are described in some detail. All were females, all recovered, and there is nothing particularly worthy of clinical note. The various possible etiological factors are discussed, though no very exact numerical evidence is given regarding the diet of the patients. It is suggested that living upon the same diet week after week may be one of the factors, and it is pointed out that such unvarying diet is especially common among women of the poorer classes. For example, one of the cases described seemingly lived on eggs alone.

A. D. B.

JELKS (John L.). **Pellagra.**—*Southern Med. Jl.* 1921. Sept. Vol. 14. No. 9. pp. 678–681. (Discussion pp. 681–683.)

The author insists that pellagra is due to the presence of intestinal parasites, chiefly Cercomonas and Trichomonas. He describes a rough chemical test by which, as he asserts, the presence of these parasites can be inferred even though they cannot be seen.

A. D. B.

WOOD (Edward J.). **Acrodynia: Its Place in Medicine and its Relation to Pellagra.**—*Amer. Jl. Trop. Med.* Baltimore. 1921. Sept. Vol. 1. No. 5. pp. 291–310.

The similarity between pellagra and Acrodynia is pointed out and discussed at length. In fact, the author believes that Acrodynia is merely one of the numerous manifestations of pellagra. It appears that even Acrodynia itself has different types, and the following varieties are described :—(1) Peripheral neuritis without digestive disturbances but with erythema on the feet and knuckles. (2) A similar condition with oedema in different areas of the body, together with vomiting and diarrhoea. In some cases a black coloration of the skin was noted, while others seemed to resemble ergotism.

The history of the disease is most carefully discussed and some interesting statements are made, especially the following :—If "pellagra and Acrodynia are one and the same disease and if the epidemic in Moravia in 1577 can be regarded as Acrodynia then pellagra is a much older disease than is usually supposed. In short the first observation of pellagra was not made in 1735 but in 1577. Therefore the disease can have nothing to do with the introduction of maize into Europe."

A. D. B.

CAMURRI (Vincenzo Luigi). **La pellagra nella provincia di Padova dopo la guerra.** [Pellagra in the Province of Padua after the War.]—*Riv. Pellagrolog. Ital.* 1920. Sept.–Dec. Vol. 20. Nos. 5–6. pp. 47–48; and 1921. Jan.–Apr. Vol. 21. Nos. 1–2. pp. 5–7.

This paper is an interim report of an enquiry with which the writer was charged by the Italian Government in August, 1919. The object was to determine the influence of war conditions on the pellagra endemic in the province of Padua. In the three years of the war the total number of reported cases increased.

No case of pellagra was found amongst breast-fed infants. Probably a few slight cases escaped observation, though on the other hand many persons were classified as pellagrous that had neither alimentary nor skin symptoms, on account of their complexion, expression and behaviour, or cases of marasmus, chronic enteritis, alcoholic erythema, etc., were called pellagra on account of the state of poverty in which the individuals were found.

J. Rosslyn Earp.

ALPAGO-NOVELLO (Luigi). **Per le Commissioni Pellagrologiche provinciale e per prevenire la pellagra.**—*Riv. Pellagrolog. Ital.* 1921. Jan.–Apr. Vol. 21. Nos. 1–2. pp. 3–4.

The budget of the provincial Pellagra Commissions, in spite of the good record of work accomplished in the last five years, has been inconsiderately reduced from 100,000 lire to one-half that amount. The writer, himself president of the Belluno Commission, points out the grave consequences of this reduction, and claims that money spent by the Commission in promoting the cultivation of beet, grass and wheat instead of the exclusive production of maize, the instruction of the public in the nature of pellagra and similar measures which the Belluno Commission has already undertaken, will make an appropriation for the treatment of pellagra unnecessary.

J. Rosslyn Earp.

AULDE (John). **The Pellagra Outlook.** [Correspondence.]—*Med. Rec.* 1921. Aug. 27. Vol. 100. No. 9. pp. 376–377.

The writer of this letter blames the Government for the presence of pellagra in the United States of America. Apparently he desires that even what a man eats shall be a question for legislation. A letter which was received from a colleague in Florida is quoted at length, and the beneficial effects of colloidal calcium in pellagra are mentioned.

A. D. B.

PUBLIC HEALTH REPORTS. 1921. July 8. Vol. 36. No. 27. p. 1565.—**Economic Depression and Pellagra Incidence.**

Economic depression in America has had an unfavourable effect upon the diet of the people. Animal foods are being reduced while cereals are increasing in amount. It was feared that this unbalanced diet would increase the incidence of pellagra. This fear is apparently well founded, for the number of pellagra cases has increased twofold in 1921 among the inhabitants of those districts from which information has been forthcoming.

A. D. B.

JORGE (Ricardo). **La question de la pellagre.**—*Bull. Office Internat. d'Hyg. Publique.* 1921. Sept. Vol. 13. No. 9. pp. 940–944.

This paper deals with pellagra in Portugal, where, apparently, the disease is more common than was supposed. The various, more or less accepted, etiological theories are discussed with relation to the conditions obtaining in that country, but no new observations are made.

A. D. B.

CLARK (G. F.). **First Report of Pellagra in Haiti.**—*U.S. Nav. Med. Bull.* 1921. Oct. Vol. 15. No. 4. pp. 813–814.

Three cases of pellagra occurring in Cape Haitien are described as the first ever noted in Haiti. All three pellagrins were females and were treated with " citrated beef blood." One died, another recovered, while the result in the third case is not clearly stated.

A. D. B.

GALBRAITH (J. B. Douglas). **Case of Acute Pellagra in Childhood.**—*Glasgow Med. Jl.* 1921. Oct. Vol. 96. New Ser. Vol. 14. No. 4. pp. 233–239. With 2 text figs.

A case of " typhoid " pellagra in a boy of three years and nine months is described in detail together with the post-mortem report. At first, in view of the nervous symptoms, a diagnosis of cerebellar tumour was made, but later, when diarrhoea, stomatitis and a symmetrical rash on the hands appeared, the case was regarded as one of pellagra. The urine showed no indican and there were no anaerobic organisms found in the stools. Horse serum and whole blood from the parents were injected subcutaneously and salines were administered. The boy died nineteen days after admission to hospital.

Post-mortem examination revealed oedema of the brain, congestion of the spinal cord, with swelling and degeneration of many cells in the anterior cornua, but no definite tract changes, the large intestine congested but not ulcerated. The heart, lungs, spleen, liver and suprarenals were normal, but there was early abscess formation in the right kidney. The diet of the child was apparently sufficient and of the necessary biological protein value.

A. D. B.

McCready (J. W.). **A Suggestion for the Treatment of Pellagra.**—*Med. Rec.* 1921. Sept. 3. Vol. 100. No. 10. pp. 417–418.

The author states that the compound of chlorine—Chlorazene—originally called Chloramine T., used by Dakin in infected wounds provides a successful method of treatment in gastro-intestinal disorders. Chlorazene, he says, is slowly decomposed in the duodenum, liberating a small quantity of free chlorine. An average dose would be Chlorazene gr. ⅓ with 10 gr. of charcoal in a capsule resistive to the action of gastric juice. This should be given not more frequently than every three hours.

The author has never used this compound in pellagra cases but recommends it to his " Southern brethren " as a possible remedy.

A. D. B.

Wylder (M. K.). **Some Newer Ideas on Treatment of Pellagra with Report of Two Cases.**—*Southwestern Med.* 1922. Mar. Vol. 6. No. 3. pp. 103–105.

Two cases of pellagra treated with " corn chop " (the husk and germ of corn) are described. One did extremely well, while the other died in a few weeks.

A. D. B.

Sullivan (M. X.). **Some Urinary Changes in Normal Individuals on the Pellagra Producing Experimental Diet.**—*Arch. Intern. Med.* 1921. July 15. Vol. 28. No. 1. pp. 119–123.

Six normal people were fed exclusively upon a diet exactly similar to that which in the experiments of Goldberger and Wheeler produced pellagra. The urine in each case was examined quantitatively as regards its main constituents.

Upon changing from a normal diet to the Rankin Farm diet the following urinary alterations were noted. " The average volume decreased; the total nitrogen and the urea nitrogen decreased markedly, the urea nitrogen especially; the ammonia decreased slightly. The ratio of urea nitrogen to total nitrogen was markedly lowered, the ammonia ratio increased."

A. D. B.

Sullivan (M. X.) & Dawson (Paul R.). **Phenols in the Urine in Pellagra.**—*Arch. Intern. Med.* 1921. Aug. 15. Vol. 28. No. 2. pp. 166–172.

The authors give the following summary :—

"The general conclusion as to the phenol excretion of the pellagra patients studied by us, mild cases for the most part, is that there is little variation from the normal either in amount of total phenols or in percentage of conjugation. Only 3 out of 16 patients showed an increase in phenols in the active stage of the disease. There is some evidence that the phenols are increased with increased protein metabolism.

"Of 12 cases tested for indican, 10 gave a marked test. What putrefaction occurs in pellagra on the diets employed seems to take place rather high up in the intestines."

A. D. B.

MISCELLANEOUS.

ZIMMERMANN (Ernest L.). **A Comparative Study of Syphilis in Whites and in Negroes.**—*Arch. Dermat. & Syph.* 1921. July. Vol. 4. No. 1. pp. 75–88.

This paper is full of valuable observations and should be compared with that of BAETZ [this *Bulletin*, Vol. 8, p. 387]. The material was obtained from the Johns Hopkins Dispensary, in which about 60 per cent. coloured and 40 per cent. white patients are treated. In all, 1,843 cases were studied: 596 white males, 521 coloured males, 297 white females and 429 coloured females.

Primary Syphilis.—Of 27 extra-genital chancres, 22, or 6·6 per cent., were in whites as against 1·4 per cent. among coloured patients. HAZEN and THOMPSON state that extra-genital chancres are rare amongst negroes.

Secondary Syphilis.—Glandular reaction in general is more marked in the negro. Thirty-one of the coloured patients complained of pain and only seven white patients; "not infrequently in early secondary syphilis the negro presents symptoms of an intense reaction on the part of the bones and joints, namely, pain with severe nocturnal exacerbation, multiple circumscribed areas of exquisite periosteal tenderness." Of the black patients 12·9 per cent. presented iritis and of the whites 1·8 per cent. Secondary lesions of the buccal and pharyngeal mucous membranes were more common among white than among negro cases. Moist papules and condylomata were much more frequent in the coloured races, especially the coloured female. "The fact that all syphilitic negro women suffer from condylomas at some time may help to explain the greater prevalence of syphilis in this race" [HAZEN].

A table is given showing the general characters of the syphilides according to sex and race. Whereas macular and maculo-papular varieties comprised approximately 70 per cent. of the eruptions in white patients and 35 per cent. in the coloured, pustular syphilides, including both the follicular and the large acuminate pustular varieties, occurred in 24 per cent. of coloured males and in 14 per cent. of black females; only one pustular rash was observed among white patients. "In a number of negroes the eruption and associated fever and malaise aroused the suspicion of variola." The most striking dermatologic peculiarity of syphilis in the negro is the annular papular syphilide; among 228 white patients presenting manifestations of early secondary syphilis typical examples of this lesion were encountered twice, while among 279 negroes it occurred in 40 cases.

Tertiary Syphilis.—The data under this head are given in the table, which repays careful study.

COMPARATIVE INCIDENCE OF TERTIARY LESIONS OF SYPHILIS IN WHITE AND NEGRO PATIENTS.

	White Males.		White Females.		Coloured Males.		Coloured Females.		White per cent.	Coloured per cent.
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.		
Cutaneous ..	32	11·8	42	27·5	34	13·7	34	15·5	17·5	14·5
Gumma ..	11	4·0	19	12·4	31	12·4	21	9·6	7·1	11·1
Nodular ..	23	8·5	23	15·1	4	1·6	13	5·9	10·9	3·6
Bone	39	14·4	21	13·7	69	27·8	70	32·0	14·2	29·6
Nose and throat	32	11·8	19	12·4	39	15·7	42	19·2	12·1	17·3
Aortitis ..	32	11·8	9	5·9	52	20·9	18	8·2	9·7	14·9
Adenitis ..	3	1·1	3	1·9	6	2·4	17	7·7	1·4	4·9
Iritis	6	2·2	5	3·2	18	7·2	11	5·0	2·6	6·2
Elephantiasis vulvae and stricture of rectum ..	—	—	—	—	—	—	28	12·8	0·0	6·0
Orchitis ..	3	1·1	—	—	9	3·6	—	—	0·7	1·9
Neurosyphilis	155	57·6	36	23·6	71	28·6	28	12·8	45·3	21·0
Tabes ..	85	31·5	9	5·9	11	4·4	3	1·4	22·3	3·0
Paresis ..	15	5·5	4	2·6	4	1·6	—	—	4·5	0·8
Cerebrospinal	55	20·5	23	15·1	56	22·5	25	11·4	18·5	17·3

Whereas the most common cutaneous lesion among white patients is the nodular syphilide, among negroes it is the gumma. These two types of syphilides are believed to represent fundamentally different biologic reactions. Tabes was diagnosed in 94 white and in 14 coloured patients; however, "the negro, in whom the occurrence of tabes at one time was the exception, yearly enters more and more into the competition of modern life and is losing his freedom from this form of syphilis."

The author's summary runs as follows :—

" *Primary Syphilis.*—Extragenital infection is relatively infrequent in negroes. Among colored males and females, the age of infection is respectively one and two years earlier than in white males and females.

" *Secondary Syphilis.*—Secondary syphilis in the negro is characterized by marked polyadenitis, by frequent and severe osteo-arthritic symptoms, by the frequency of iritis, and by the high incidence of follicular and pustular syphilids. A striking racial peculiarity is the frequent occurrence of the annular papular syphiloderm.

" *Tertiary Syphilis.*—Bone syphilis is the most frequent lesion of tertiary syphilis in the negro, exceeding neurosyphilis, which in white patients comprised almost half of all late manifestations.

" Cardiovascular syphilis is more frequent in the negro, with an incidence of two to one in colored and white males, respectively.

" Stricture of the rectum and elephantiasis vulvae are extremely common in the colored female.

" Leukoplakia is rare in the negro.

" Tertiary adenitis is common in the negro.

"Neurosyphilis is more frequent in white patients than in negroes. The negro is less likely to develop tabes or paresis, while the large group of unclassed cases of cerebrospinal syphilis is approximately of equal frequence in the two races. In negroes it is especially likely to manifest itself in the form of cerebrospinal endarteritis.

CONCLUSION.

"In respect to syphilitic infection there exist inherited biologic differences between white and negro patients. The negro develops intense reactions on the part of cutaneous and osseous structures, and is relatively free from tabes and paresis. In white patients, syphilis more frequently runs its course with skin manifestations slight or absent, but there is a greater tendency toward the eventual development of tabes or paresis."

A. G. B.

PIJPER (Adrianus). **Syphilis among the Coloured Population of Pretoria: A Record of 500 Wassermann Reactions.**—*S. African Med. Rec.* 1921. Aug. 27. Vol. 19. No. 16. pp. 302–305.

After some remarks on the value of a positive Wassermann as indicating syphilis, and on the lack of information as to the spread of the disease among the coloured population around Pretoria, the author gives the results of the blood test in the case of 500 specimens obtained, chiefly in the out-patient department, at the Pretoria hospital. The great majority were pure natives, the rest Asiatics, half-castes and various mixtures. Such cases as were *prima facie* syphilitic were excluded. Notwithstanding the venue of the samples the author believes that they represent fairly well the total coloured population of Pretoria and its surroundings. The technique was that of WASSERMANN, as given in KOLLE and WASSERMANN's Handbuch.

The results were as follows:—

	Number.	*Percentage.*
Strongly positive (+ + + +)	184	36·8
Positive (+ + +)	55	11·0
Weakly positive (+ +) ..	47	9·4
Dubious (+ —)	35	7·0
Negative (— — — —) ..	177	35·4
Autofixation occurred in ..	2	0·4

Disregarding all but the strongly positives it is concluded that 184 of 500 coloured people, or 36·8 per cent., are syphilitic.

The author points out the dangers to the white community, as many of these cases are employed as houseboys and housemaids, and also to the coloured people themselves. He quotes from LIVINGSTONE to the effect that syphilis tends to die out in pure bred Africans, but considers that there is no evidence for or against this belief.

A. G. B.

BRISCOE (Cornelius D.). **Syphilitic Hepatitis.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Pt. 1. pp. 45–47.

Negro labourers were admitted to Ancon hospital with the following symptoms: mental apathy, yawning, fever, accelerated pulse, moderate jaundice, pain and tenderness over the liver. In the early part of the attack there was loss of appetite, slight nausea and, rarely, vomiting. Liver abscess was first thought of and was not excluded by a leucocyte and differential count. All had, however, some sign or symptom of syphilis. The Wassermann reactions were positive and intensive syphilitic treatment led to a fall of temperature and subsidence of symptoms. An account of hepatic syphilis is given from LINDSEY and from OSLER.

A. G. B.

CHRISTIDI (Ch.). **La syphilis en Perse à travers les siècles.**—*Presse Méd.* 1922. Mar. 15. Vol. 30. No. 21. pp. 425–426.

The author tells us that he has seen in Persia baked earthenware plaques on which the symptoms of syphilis were inscribed, such as oral sores, hoarseness, severe headaches, proving that syphilis was widespread at that date and that the disease in Asia was propagated by Phoenician merchants. Arab manuscripts of 450 B.C. found near Ispahan describe, and confound, leprosy and syphilis. The disease to-day is mild and the lesions clear after a few injections of a mercurial. Amongst 3,000 syphilitic patients not more than 50 followed regular treatment, but after the second or third year, he states, the Wassermann was feebly positive or was negative. No parasyphilitic sequela was seen in a Persian, though the upper classes are brain workers and use alcohol as well as opium. Europeans infected from Persian women had the disease lightly, whereas those infected from non-Persian women suffered grave and persistent infections ; two among 20 such had general paralysis. The author states, on the authority of bacteriologists in Persia, that treponemata examined in Persia are "degenerated," are shorter than those examined in Europe, and usually have fewer spirals.

A. G. B.

LEMANN (I. I.). **Diabetes mellitus, Syphilis in the Negro.**—*Amer. Jl. Med. Sci.* 1921. Aug. Vol. 162. No. 2. pp. 226–230. With 2 charts in text.

WARTIN (*Amer. Jl. Med. Sci.*, 1916) concluded from the evidence of all his diabetes autopsies at Michigan that in diabetes, when it is due to pancreatitis, syphilis is an antecedent factor, although syphilitic pancreatitis did not always present the clinical symptoms of diabetes. The present author, converting this limited proposition into the universal proposition that syphilitic pancreatitis is the common cause of diabetes, argues that if this were so then in the Southern United States diabetes should be much commoner among the negroes, whose general syphilization is notorious, than among the whites. His statistics from the Charity Hospital at New Orleans show, however, that during 22 years the percentage of diabetics among negroes is only 30, whereas among whites it is 70. He concludes, therefore, that either there is no causal connexion between syphilis and diabetes, or [more justly from the premises] that there exists an unexplained immunity of the negro race to pancreatic manifestations of syphilis just as there exists an unexplained immunity of that race to locomotor ataxic manifestations.

A. Alcock.

LEMANN (I. I.). **Diabetes Mellitus in the Negro Race.**—*Southern Med. Jl.* 1921. July. Vol. 14. No. 7. pp. 522–525.

An analysis of the cases of diabetes admitted to the Charity Hospital (?) New Orleans, for the period 1910–19 showed 135 to be whites and 59 to be negroes. The admissions were 92,000 and 68,000 respectively, so that the negroes furnished 43 per cent. of the admissions but only 30 per cent. of the diabetics.

A. G. B.

SUR (Taraknath). **Broncho-Moniliasis.**—*Indian Med. Gaz.* 1921. Dec. Vol. 56. No. 12. pp. 445–449. With 1 chart and 2 coloured plates.

A European in England after many years' service in India contracted bronchitis in April, 1920, followed in the course of the next twelve months by two attacks of pleurisy, frequent asthma, evening fever, blood-stained expectoration and, besides other symptoms, loss of a stone and a half in weight and incapacity for work. Tubercle bacilli could not be found (number of examinations not stated). In July, 1921. during an attack of pleurisy and pneumonia in India the sputum was found to contain a Monilia. Potassium iodide, 20 gr. thrice daily, increased to 45 gr., was given with four injections of an autogenous vaccine prepared from cultures of the Monilia. He quickly recovered and at the time of writing was well. The characters of the Monilia are given; it corresponds with *M. tropicalis* Castellani. To explain the onset in England the author suggests the patient was a carrier of the infection, which manifested itself after a chill.

A. G. B.

COLARES (J. V.) & GUIMARÃES (Ugo Pinheiro). **Um caso de micose pulmonar.**—*Arch. Brasileiros dc Med.* 1921. Apr. Vol. 11. No. 4. pp. 288–290.

An account of a case of pulmonary mycosis in a negro woman of 24. The disease commenced about a year before the patient came under the authors' observation by pricking sensations under the left breast. These were soon followed by pains of rapidly increasing severity in various parts of the chest, aggravated by the movements of respiration and accompanied by a dry cough. Later on there was blood-stained expectoration to which succeeded definite haemoptyses. Other symptoms were fever, chiefly vespertinal, headache and a marked feeling of weakness, which contrasted with the patient's generally well nourished condition. Examination of sputum for T.B. and Wassermann reaction both negative. The patient's occupation involved the constant handling of grains, flour and bran. On a provisional diagnosis of pulmonary mycosis the patient was given endovenous injections of potassium iodide, under which her condition rapidly improved. The diagnosis was confirmed by the finding of *Aspergillus fumigatus* in the patient's sputum.

F. S. Arnold.

FARAH (Najib). **La moniliase bronchique en Egypte.**—*Presse Méd.* 1921. Sept. 7. Vol. 29. No. 72. pp. 713–716. With 2 text figs.

The paper, based on four cases seen by the author in Egypt, deals with all aspects of the disease and its parasitic cause. The organism in each instance was *Monilia Pinoyi* Castellani. Cultures injected into the veins of rabbits caused an acute infection with Monilia with death on the sixth day; and sections of the lung and kidney showed the presence of the fungus. A case in which death resulted is detailed at considerable length. The treatment advised is injectable iodine in the form of lipoidol, introduced into the gluteus muscle. In the author's cases the fungus disappeared from the sputum after the third injection.

A. G. B.

SARTORY (A.) & MOINSON (L.). **Sur un cas de moniliase bronchique.**—*C.R. Acad. Sci.* 1922. Jan. 3. Vol. 174. No. 1. pp. 77–79.

The patient was a man of 38, resident in Paris, who for two months had suffered from cough with expectoration of blood. His appearance and the results of the physical examination suggested phthisis. Tubercle bacilli were not found in the sputum, but rounded or oval cells which were cultivated and determined as *Monilia Pinoyi* Castellani. The cultural and biochemical characters of the fungus are described. The intravenous inoculation of pure culture to a rabbit resulted in a generalized mycosis. The fungus was found in sections of the lungs and kidneys. The patient was treated with injectable iodine (huile iodée) and four months later appeared to have recovered. The Monilia could no longer be found in the sputum.

A. G. B.

MENDELSON (Ralph W.). **Pulmonary Tuberculosis, Pulmonary Mycosis and Pulmonary Spirochetosis.**—*Milit. Surgeon.* 1921. July. Vol. 49. No. 1. pp. 81–82.

The author, who is Principal Medical Officer of Health to the Royal Siamese Government, states that on careful examination of the weekly health returns of the city of Bangkok it is found that from 17 to 33 per cent. of the deaths are reported as due to tuberculosis of the lungs, but careful examination and observation of pulmonary cases applying for treatment at one of the local charitable institutions showed that 25 per cent. are mycotic or spirochaetal; and of those diagnosed as tuberculosis only 10 per cent. can be confirmed bacteriologically.

Symptomatically these three conditions cannot be differentiated. Diagnosis is made in the laboratory and tuberculosis is ruled out only after animal inoculation. Moniliasis will be proved by a glucose agar culture made with proper precautions, and spirochaetosis by direct examination of slides, silver nitrate being the most useful stain. Treatment for these two infections is by iodides and by arsenic. Differentiation of the three conditions discussed is of great importance.

A. G. B.

MENDELSON (Ralph W.). **Experimental Pulmonary Mycosis in Guinea-Pigs.**—*Jl. Trop. Med. & Hyg.* 1921. Nov. 15. Vol. 24. No. 22. pp. 292–294. With 4 text figs.

Pulmonary mycotic infections are widely prevalent in Siam. Though a variety of moulds have been recovered the symptoms do not differ. One of these has been cultivated and used to produce an experimental infection in guinea-pigs, which were kept under observation for a month. They showed no signs of illness when killed. The lungs were found to contain tumour-like masses consisting of connective tissue with no tendency to break down. Microscopically a number of solid or semi-solid areas were demonstrated, some of the vesicles containing red cells, a few including mononuclear leucocytes. The capsule of the enlarged peribronchial lymph nodes was greatly thickened and contained a mass of polymorphonuclears only partly filling the cavity. Mycelium was not seen but conidia were present in many areas. Two monkeys were infected but remained well. The author considers pulmonary mycosis to be of great importance: it is incapacitating but preventable. Figures show the naked eye and microscopic appearances of the guinea-pigs' lungs.

A. G. B.

MACFIE (J. W. S.). **Notes on Some Fungal Infections in West Africa.** —*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 271–282.

This paper is in four sections, two describing fungi of the genus *Monilia* recovered from patients suffering from diarrhoea, the third describing a case of otomycosis and the fourth a case of tonsillar nocardiomycosis, all observed at Accra.

> " No evidence is brought forward in support of the view that the species of Monilia described . . . were the sole cause of the dysentery and diarrhoea with which they were associated . . . but it is maintained that they were the cause of some of the symptoms."

The first case was that of a European with dysenteric diarrhoea; no amoebae could be found, but Morgan's bacillus was isolated. The Monilia obtained resembled *M. tropicalis* Castellani, and was close to *M. accraensis* [this *Bulletin*, Vol. 18, pp. 295–96.] The cultural characters and biochemical reactions are given, with a table.

The natives of Accra suffer from a well-defined form of persistent diarrhoea which some consider to be akin to sprue.

> " The stools are bulky, frothy, and generally canary-yellow coloured; the tongue is red, fissured, and eroded; and the patients are wasted—a condition which is often masked by oedemas of the limbs and by ascites. The faeces in such cases usually teem with yeast-like cells . . . stages of fungi of the genus *Monilia.*"

Two cases are described here; one of the fungi cultivated belonged to the *Pseudolondinensis* group, the other to the *Krusei* group of CASTELLANI and CHALMERS. The names *Monilia africana* and *M. enterocola* are proposed.

The case of otomycosis, in a lady, caused pain and irritation in the ear; the condition was relieved and apparently cured by an application containing salicylic acid. The fungus appeared to belong to the genus *Sterigmatocystis.*

The case of tonsillar nocardiomycosis was that of a European with a number of small white concretions in crypts of both tonsils. There was no pain or discomfort. Scrapings consisted mainly of fungal hyphae. Inoculations on agar and glucose agar were unsuccessful. The condition is figured in CASTELLANI and CHALMERS' book.

A. G. B.

MACFIE (J. W. S.) & INGRAM (A.). **A Fungus of the Genus** *Nocardia* **Cultivated from Heart Blood.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 283–285.

The fungus described was cultivated from blood withdrawn from the heart at the autopsy of a native who died at Accra of an obscure complaint. Both lungs were affected with bronchopneumonia but nothing else definite was found.

The cultural characters and biochemical reaction are described. Growth was almost restricted to potato and media containing either blood serum or ascitic fluid. The authors believe the fungus to be a new species and propose the name *Nocardia cruoris*

A. G. B.

GALE (A. M.). **Some Points in the Epidemiology of an Outbreak of Cerebro-Spinal Fever in Hong Kong, 1918.**— *Jl. of Hyg.* 1921. Nov. Vol. 20. No. 3. pp. 289–318. With 3 charts, 2 maps and 1 fig.

Though the epidemic of cerebro-spinal fever in Hong Kong in 1918 was not recognized till February, the death returns suggest that the disease was present previously, probably from 1914 onwards. The epidemic was immediately preceded by widespread catarrhal pharyngitis, and by the reporting of 12 cases of haemorrhagic smallpox; as there were no ordinary cases of this disease in the Colony it may be assumed that these were cerebrospinal fever and the same conclusion applies to a number of cases in January returned as typhoid fever, though the Widal reaction had been consistently negative.

The records of the epidemic were taken from February to June, when it was on the wane, and include a total of 1,040 cases; March was the month of greatest incidence. The number of deaths was 889, including 519 brought in dead or *in extremis*, a mortality of 85·48 per cent., but many cases were concealed, or so mild that they escaped detection. A large number of cases occurred in the practice of the local doctors presenting " headache, sickness, stiffness of neck, varying degrees of prostration, and complaint of dazed sensation." These recovered completely without diagnosis. The addition of such would lessen the percentage mortality. Graphs show that of the 1,040 cases 318, or 30·5 per cent., occurred in children of five and under, with a mortality of 96·5 per cent., and 42 per cent. were among children under ten. The susceptibility then diminished gradually to old age, when there was a slight increase. There were only four cases in Europeans.

A chart shows the daily number of cases and its relation to the meteorological conditions. The curve of the daily incidence follows a remarkably wavy course, with four high peaks representing an incidence of over 20 cases per day. Certain meteorological conditions were constant for each of these peaks. It was preceded at an interval of three days, early in the epidemic, to seven, later, by a drop in the temperature, which was steadily maintained and accompanied by saturation of the air and absence or diminution of sunshine; rainfall showed no appreciable effect.

The next section concerns the geographical distribution of the cases and overcrowding. The estimated population of Hong Kong and Kowloon in 1917 was 535,000—521,000 Chinese—but the migratory population is immense; it is estimated for the same year that 1,321,000 arrived and 1,250,000 departed. Even this does not include the families which come and go in junks and sampans.

The city of Victoria is believed to have an average density of 350 persons per acre, and there are three health districts with respective densities of 863, 981 and 1,000 persons per acre. "It is highly probable that Hong Kong in the next census will head the list for overcrowding in any British community." The housing conditions have been bad since 1902, when C. CHADWICK reported on them—too many houses on too small a space, sanitary defects in their design, overcrowding in the houses themselves, rooms badly lit and divided up into cubicles. From figures collected by the author from patients it appears that 16·7 per cent. of the floors contained 16–20 inhabitants per floor, and 6·9 per cent. 21–25 inhabitants per floor. The floor area per person was in many instances inadequate and below the scale of the Public Health Ordinance of Hong Kong, namely 30 sq. ft. A spot map shows that the three health districts referred to above as the most grossly overcrowded yielded the largest number of cases.

As to the habits of the Chinese, it need only be mentioned that they clear the naso-pharynx by way of the mouth and expectorate profusely indoors as well as outdoors.

Figures were obtained of the length of residence in the Colony of the 1,040 patients: 9·5 per cent. became infected in their first week, 4·8 in the second, 10·0 in the third, and 13·6 in the fourth, or 37·9 per cent. in the first month; 7·1 per cent. had been resident three days or less. Case incidence is high in recent arrivals, just as in armies it is in the fresh recruits (FLEXNER), and the migatory character of the population ensures a constant supply of susceptible persons. It was not practicable to make a routine search for carriers, chiefly owing to insufficiency of staff and anticipated objections from the Chinese. Moreover, if found they could not be isolated during the early stages of the epidemic. For contacts a portable atomizer, which is illustrated, was supplied to the sanitary inspectors. The solution used was one per cent. zinc sulphate and the infected house was visited for five days in succession. All the inmates were thus treated and instructed to gargle with a patent disinfectant available in the Colony. The author expresses no opinion of the value of the atomizer as a disinfectant, but "they served the useful purpose of a panacea for the panic-stricken." In Hong Kong, however, the recognition and isolation of carriers played no part in checking the epidemic. The author suggests as most practical a screen of transparent celluloid extending from the hat-brim to a little below the chin. This would be compulsory wear for known carriers.

A. G. B.

i. HOEY (Matthew J.). **Recent Outbreak of Meningitis and its Management.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 33–36.

ii. TEAGUE (Oscar), BATES (Lewis B.) & MCFARLAND (William L.). **The Bacteriological Examination for Meningococcus Carriers at the Balboa Quarantine Station following the Recent Outbreak of Meningitis among Japanese Steerage Passengers on the Steamship "Anyo Maru."**—*Ibid.* pp. 39–45.

i. A Japanese steamer reached Balboa on May 7, 1918, having left Hong Kong 45 days before and called at several ports. It carried

500 Japanese immigrants, 101 Chinese and other steerage passengers, and 61 first and second cabin passengers. Cases of meningitis had probably occurred from April 11 onwards, all fatal, but diagnosis was rendered difficult by a synchronous epidemic of influenza. In all seven deaths were reported, five probably due to meningitis. Segregation and isolation were carried out on board with fair efficiency and no cases occurred among cabin passengers or crew. The ship left Balboa on May 11 and returned on the 27th, having been refused permission to land passengers at Callao, Peru. Seven more cases of meningitis had developed, with three deaths.

The passengers were landed and isolated in several groups. The cases were energetically treated in the isolation hospital, no more deaths occurred and only three fresh cases, all within 48 hours. No carriers were found among the crew but amongst the rest the proportion was high, exceeding at one time 10 per cent., and some persons who at first gave negative cultures afterwards qualified as carriers. Though isolation of carriers as individuals was impossible, no clinical cases appeared. It was decided to release the carriers after two consecutive negative cultures, and 95 per cent. were discharged within 60 days.

ii. Details of the examination for carriers are given—the preparation of the ascitic-fluid-agar, the obtaining of swabs and cultures at the rate of 75–100 per hour by two experts and three assistants, and the subsequent manipulations. The results appear in a series of tables. Excluding the first class passengers, who were well isolated and none of whom was found positive, there were 126 persons positive for meningococci out of 568, or 22 per cent. ; 71, or more than half, were detected in the first two weeks. There was then an average of about 16 per week of fresh carriers for three weeks, after which very few new positives were discovered, but positive examinations are recorded over the whole period from May 31 to September 23.

" The outstanding feature," the authors write, " of these results is that the examination of a large group of men living in intimate contact and the isolation of those found positive for meningococci does not prevent the development of carriers among those remaining. The complete elimination of carriers is most difficult to accomplish even by repeated examinations at short intervals."

As recorded by Hoey there were no new cases of meningitis. Details are given of five chronic carriers, three of whom were detected at the beginning and were still positive when discharged on September 23.

A. G. B.

PELTIER & CAVAZZA. **Épidémie de méningite cérébro-spinale à bord du** *Roberto-Figueras*, **transportant un convoi de coolies Annamites.** —*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 188–192.

The story is told of a steamer which left Haiphong on July 6 for New Caledonia with 990 Annamite coolies, many of them ailing, crowded together in a confined space without possibility of isolation in case of sickness. All went well till the 14th, when there were complaints of fever, and on the two following days two coolies died in coma. By August 1, when the ship reached Townsville, there had been eight deaths and on the following day at the anchorage, eight died on board. Here the diagnosis of cerebro-spinal meningitis was bacteriologically confirmed, and 31 patients were put ashore. The ship sailed on the 4th, and reached Nouméa on the 10th, at which date 20 coolies had the disease. The sick and the healthy were now segregated and the latter, with the crew, were submitted to periodical disinfection of the pharynx and nasal fossae. The crew remained free from disease and no carriers could be detected amongst them.

The net result was that 65 coolies were attacked and 28 died. The authors suggest that the epidemic was due to exaltation of the virulence of meningococci carried by healthy persons, under the unfavourable conditions of the voyage.

A. G. B.

DE MELLO (Froilano). **Une épidémie de méningite cérébro-spinale dans l'Inde Portugaise.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 398–405.

According to the author, cerebrospinal meningitis was first reported from India by ROBERTSON MILNE in 1906 [earlier records are those of Vandyke CARTER (1882) and DIMMOCK (1884) (CASTELLANI and CHALMERS)].

The disease made its appearance in Portuguese India in 1918, but was not recognized for some time, till the author obtained by lumbar puncture the specific organism. Kernig's sign was absent: there was no labial herpes, nor tache, nor contracture of the neck; in grave cases rather paresis of the head. Abortive forms, limited to an attack of vomiting or a loose stool with slight meteorism, were frequent. In some districts 60 per cent. of the inhabitants were attacked, mostly children below the age of six. The mortality did not exceed 18 per cent. In the single autopsy which was made the brain lesions were those of diffuse haemorrhagic meningo-encephalitis. It is noted that in some districts the appearance of meningitis was preceded by veritable epidemics of adenitis, to which no importance was attached.

No elaborate bacteriological investigation could be made, but sufficient was done to identify the organism found as the meningococcus of Weichselbaum.

A. G. B.

WATKINS. **[Treatment of Cerebro-Spinal Meningitis: Diagnosis and Treatment.]**—*Proc. of the [Transvaal] Mine Med. Officers' Assoc.* 1921. June. Vol. 1. No. 3. pp. 8–12. (With discussion.)

Points emphasized in this paper are the cogency of early diagnosis, the supreme necessity of slowness and caution in performing lumbar puncture, and the employment of an authentic serum in sufficient quantity.

In the operation for lumbar puncture a syringe is never used. The spinal needle being introduced, about 85 drops (5 cc.) of fluid are first collected at the rate of about 20 to 25 drops a minute, from which two smears are made for confirmatory diagnosis. If the diagnosis is confirmed more fluid is slowly run off, up to 50 or 60 cc., if possible, the amount being determined by the state of the pulse. The serum is then allowed to flow in gently through the spinal needle, and when the operation is completed the foot of the bed is raised about nine inches for six hours so that the serum may find its way to the patient's brain. The amount of serum introduced is 50 cc., and six hours afterwards a dose of 25 cc. is injected intravenously. On the next day 50 cc. are again introduced intrathecally and 25 cc. intravenously, and on the third day 50 cc. intrathecally only. Then, after an interval of three days, injections are repeated as symptoms indicate, though it has to be borne in mind that mere rise of temperature may be caused or increased by injections and will yield to one or two full doses of aspirin.

The serum prepared at the South African Institute of Medical Research seems to be very efficacious: in nine cases treated in 1920 only one death occurred: it is made from material collected at the mine hospitals and so is almost autogenous.

A. A.

LISTER (Spencer). **The Laboratory Aspect of Meningococcal Meningitis, with a Brief Review of Infection and Immunity.**—*Proc. of the [Transvaal] Mine Med. Officers' Assoc.* 1921. June. Vol. 1. No. 3. pp. 1–8. With 2 text figs.

This is a fine summary dealing with the biological principles of immunity in general and with the natural and experimental history of the meningococcus and of anti-meningococcal serum, and with the manner in which the organism is "carried" and spread.

A. A.

i. MACCALLUM (W. G.) & MOODY (L. M.). **Alastrim in Jamaica.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 388–409. With 9 plates.

ii. MOODY (L. M.). **Alastrim; or, Kaffir Milk Pox.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 21–46. With 3 charts and 5 plates.

i. This paper is a valuable contribution to the subject of Alastrim—the text as well as the nine beautifully clear photographs of patients illustrating the rash. The symptoms and course of the disease, the histological changes in the skin, the relation of vaccination to alastrim, are retailed or discussed.

Dr. MacCallum spent only ten days in Jamaica, in September, 1920, but Dr. Moody, the Government Bacteriologist at Kingston, had been studying the clinical phenomena since May, when the epidemic began. In 202 cases the incidence of the symptoms of onset was as follows:—

Headache in 172 cases	85 per cent.
Pain in back in 111 cases [severe only in 45]	54 ,,
Pain in limbs in 41 cases	20 ,,
Vomiting in 32 cases	15 ,,

The characters of the eruption are minutely described. Pustulation and crusting occur but there is no noticeable odour about the patients, a point which medical officers in the tropics who have had to visit small-pox hospitals will readily appreciate. Of 2,333 cases reported only ten died: three were children who contracted the disease shortly after birth, and four were women pregnant 6–7 months, who displayed a decided tendency to haemorrhage. Two macerated foetuses, born a month after the mother's attack, had what appeared to be pocks on the skin and, which seems more remarkable, two women gave birth to full-term infants showing an unmistakable eruption of alastrim though neither mother had had the disease and both had been vaccinated 4–6 weeks before delivery.

The earliest stage of the rash studied histologically was from skin excised on the third day; the authors think that study of an earlier stage is desirable. Section shows an intense inflammatory reaction in the corium, though the changes in the overlying epithelium are only in their inception. It is concluded that the infective agent begins its activity in the corium and it is considered improbable that the hypothetical organism is a parasite of the epithelium. The general opinion of observers is that alastrim confers little immunity from vaccination with cowpox, but it is noted that variola protects against vaccinia in only 50 per cent. A table of 44 cases in non-vaccinated children, 26 in those with scars of successful vaccination and six with a history of such vaccination but no scars, classed in each instance as severe, medium and mild cases, shows that more than half the cases in the non-vaccinated were severe or medium, whereas only six of the remaining 32 come in this category. In spite of vaccination there were many alastrim cases in children, but figures of vaccination of contacts show that it gives a large measure of protection, which, in the authors' opinion, must be held to be evidence of the extremely close relationship of variola and alastrim.

Sixty cases were vaccinated after recovery from alastrim; in the 45 who "took" the following phenomena were noted: tardy development and slow course of the lesion, small size of the vesicles, exuberant base and imperfect umbilication, insignificance of the local and constitutional reaction. The authors were entirely unsuccessful in transmitting the disease, in however localized a form, to rabbits or calves.

In their final discussion the authors remark that the dogmatic conclusion found in most text-books, to the effect that vaccinia is merely small-pox attenuated and permanently altered by passage through calves, is unjustified. The uncertainty of this relation, not to be resolved till the organisms concerned are isolated in pure culture, concerns also that between small-pox and alastrim. On account of the extraordinary variation in severity in what has been regarded as true small-pox the distinction is rendered still more difficult: mild cases of small-pox often show only a few scattered pocks and slight fever, whereas in alastrim the initial fever is high and the body is covered with pocks.

The practical conclusion is that the spread of the disease is restricted by prompt vaccination and revaccination. [See LEAKE and FORCE, this *Bulletin*, Vol. 18, p. 293.]

ii. An account of the same epidemic covering, in part, different ground and illustrated by another series of excellent photographs. The study is based on 2,912 cases which passed through the Isolation Hospital at Kingston. In those cases in which a definite history of exposure was obtained the incubation period was from 10–14 days. A rise of temperature was constant. The eruption appeared with equal frequency on the 3rd and 4th day. Of the 202 cases tabulated in (i) the location of the rash at the onset was as follows:—

Face	120
Wrist and forearm	52
Both arm and face	27
Scrotum	1
Inner side of knee	1
Elbow	1

The rash tends to affect the face, lower half of back, arm and forearm, especially towards the wrists; it is also seen on the scalp, in the mouth and larynx and invariably on the palms and soles.

The virus passes fairly readily into the foetal circulation, for in 20 cases admitted after an attack of alastrim into the Maternity Hospital there were eight instances of abortion at about the sixth month and in each the macerated foetus was scarred. In two cases fully investigated the Wassermann was negative. Only eight of the 20 mothers produced normal babies. The author discusses at greater length the instances in which the infant was born with alastrim though the mother had shown no sign of the disease; he admits the possibility of generalized vaccinia but is rather of opinion that they illustrate the transmission of alastrim from immune mother to unborn child.

A. G. B.

WATKINS (V. E.). **The Relationship of Alastrim to Smallpox.**—*Med. Record.* 1921. Dec. 31. Vol. 100. No. 27. (Whole No. 2669). pp. 1149–1151.

During 1920 alastrim entered Santo Domingo from Haiti, the western third of the island [see this *Bulletin*, Vol. 18, p. 292], and gradually spread eastward. Before it arrived a campaign of vaccination was instituted on the author's plantation, and to this is attributed the fact that of 7,000 possible victims only 88 contracted the disease. Children seemed to be relatively immune. In all cases where the date of exposure could be fixed the incubation was 21 days. The account of the symptoms presents nothing novel except that many of the cases had secondary fever, reaching in confluent cases 104°. Bad cases showed considerable pitting about the nose and cheeks. There were no deaths. The author concludes that the disease is smallpox and is best known under that name, and he asserts in explanation of its mild character that "no infectious or contagious disease runs true to form in the tropics except pulmonary tuberculosis."

A. G. B.

HOFFMANN (W. H.). **The Diagnosis of Variola by Inoculation of the Cornea of the Rabbit.**—*Med. Record.* 1921. Nov. 26. Vol. 100. No. 22. (Whole No. 2664). pp. 936–938.

Variola of a very mild type, and consequently difficult to diagnose, has recently been introduced into Cuba from Haiti and Jamaica. A simple practical test, devised by PAUL, depends on the fact that if superficial lesions are produced on the rabbit's cornea and infected with the virus of variola, 24–36 hours later the epithelium at the site of the inoculation proliferates; the proliferation spreads to the surrounding tissues and is followed by desquamation of epithelium in the central parts.

The author performs the test as follows:—

"A small quantity of the secretion from a suspicious pustule is removed by a small knife or needle, previously sterilized in the flame, and placed on a sterilized slide, cleansed by alcohol. The slide is put in a Petri dish and allowed to remain for some time. The dried secretion may be used for the test, as it has only to be moistened at the moment of inoculation of the animal, and for which either Ringer's solution or a few drops of a 50 per cent. glycerine solution in water may be used. . . . .

" The rabbit to be used may be of any kind or size. The cornea may be anesthetized by a cocaine solution, but it is not absolutely necessary. The animal may be wrapped in a towel, all but the head, to ensure greater ease in technique, and then held down on the table by two of the operators.

" With a small sharp steel needle, previously sterilized by flame, there are made from 3 to 5 superficial horizontal incisions across the epithelium of the cornea of the eye, and as many in a vertical direction, crossing the first group of lines. It is not difficult to hold the eye open and fixed with the left hand, while with the right hand the above-described operation can be performed in a few seconds. Following this, a quantity of the secretion to be tested is then placed on the surface of the cornea with a small, blunt, properly sterilized instrument, and thoroughly distributed by a closing movement of the eyelid. The inoculated animal is then placed in a cage and treated as a highly contagious case.

" If no specific, variolic infection of the cornea has taken place, the small traumatic lesions will be healed in twenty-four hours; and after forty-eight hours the cornea will appear absolutely clear and without irritation. If, however, the eye has become infected with variola virus there will appear on the cornea, from thirty-six to forty-eight hours after injection, certain lesions which may be visible to the naked eye, but are much more clear under a low power lens. A definite irritation of the eye and some slight grayish epithelial prominences will be seen on the surface of the cornea.

" Forty-eight hours after inoculation the rabbit is killed by a blow in the neck in all cases, irrespective of reaction. The eye which has been used for the experiment is enucleated with great care by the method used in ophthalmological work, cutting through the external muscles and the optic nerve. The bulb is immediately placed in the alcoholic sublimate solution already detailed*, and fixed for from one to two minutes. Then the cornea is separated from the eye in a line near the limbus with a small Graefe knife or fine, sharp, iridectomy scissors. Any pressure on or lesions to the corneal tissue should be avoided.

" The cornea, lying in the solution, may then be inspected with a lens. If infection has taken place there will appear along the criss-cross lines previously made small, isolated circumspect prominences of a porcelain-white color, and which contrast sharply with the rest of the cornea which presents a diffuse grayish opacity. The prominences may be confluent when a secretion of great virulency has been used for inoculation. . . . .

" Forty-eight hours after infection has taken place, there will be found in the center of the variolic proliferation, which is still progressive in the peripheral parts, a desquamation of the epithelial cells; and after ninety-six hours there will be developed a round crateriform depression with a very sharply defined rim. This type of proliferation is pathognomonic of variola. These macroscopical lesions are so characteristic of variola that they allow of an undisputed diagnosis of this condition. For scientific purposes, however, the diagnosis can be confirmed by the histological examination."

For details of the histological examination the paper must be consulted. A positive reaction is diagnostic of variola, and variola virus gives a positive result in 90 to 95 per cent. of cases. A negative result, however, is not conclusive. Varicella does not give the reaction. No reference is made to alastrim.

A. G. B.

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* Four gm. of sublimate, 30 cc. of 98 per cent. alcohol, and 60 cc. of distilled water.

i. FRANCIS (Edward). **Tularaemia Francis 1921. i. The Occurrence of Tularaemia in Nature as a Disease of Man.**—*Public Health Rep.* 1921. July 29. Vol. 36. No. 30. pp. 1731–1738.
ii. —— & MAYNE (Bruce). **ii. Experimental Transmission of Tularaemia by Flies of the Species** *Chrysops discalis.*—*Ibid.* pp. 1738–1746.
iii. —— & LAKE (G. C.). **iii. Experimental Transmission of Tularaemia in Rabbits by the Rabbit Louse,** *Haemodipsus ventricosus* **(Denny).**—*Ibid.* pp. 1747–1753.
iv. —— & ——. **Transmission of Tularaemia by the Bedbug,** *Cimex lectularius.*—*Ibid.* 1922. Jan. 20. Vol. 37. No. 3. pp. 83–95.
v. —— & ——. **Transmission of Tularaemia by the Mouse Louse,** *Polyplax serratus* **(Burm.).**—*Ibid.* pp. 96–101.
vi. ——. **Cultivation of** *Bacterium tularense* **on Mediums New to this Organism.**—*Ibid.* pp. 102–115.
vii. —— & LAKE (G. C.). **Six Cases of Tularaemia occurring in Laboratory Workers.**—*Ibid.* Feb. 24. No. 8. pp. 392–413. With 2 charts.

i. Tularaemia is a specific disease due to infection with *Bacterium tularense* [see this *Bulletin*, Vol. 5, p. 404, and Vol. 15, p. 21]. As at present observed it occurs in certain rural parts of Utah in the summer months (June–August), and being a severe fever of a septic type, from which convalescence is protracted, it seriously disables the patient at his busiest season. Fatal cases have been reported.

The observations and experiments recorded in this paper show that the infection is derived from rodents (chiefly, it would seem, the jack rabbit) in which it is kept going by blood-sucking ectoparasites (chiefly, it would seem, the rabbit louse, *Haemodipsus ventricosus*). In rodents it appears to be a serious or fatal infection, causing buboes and typical changes in the spleen and liver.

They show also that the infection is imparted from rodents to man by blood-sucking insects (chiefly, it would seem, *Chrysops discalis*). In man the infection quickly spreads from the site of the bite, causing painful lymphangitis and adenitis, which commonly goes on to suppuration and requires surgical treatment; there is also fever of sudden onset, and prostration. Recovery is slow, taking from six weeks to three months; one of the seven cases here reported had a fatal ending on the 26th day, the bite having been on the neck and the adenitis extending to the mastoid region.

In a survey made in June–August, the specific bacterium was isolated from 17 out of 556 jack-rabbits and from 1 out of 277 ground-squirrels shot in the field.

ii. As regards the agency of *Chrysops discalis*, experiments were carried on during the summer months with captured flies allowed to bite, first, guinea-pigs and rabbits experimentally infected with the specific bacterium, and then—from a few seconds up to 24 hours afterwards, and in one case four days afterwards—healthy guinea-pigs and rabbits imported from Washington. Of 38 such experiments 11 were successful. These 11 successful experiments are recorded, and they show that 5 of the guinea-pigs and 6 of the rabbits from Washington died of tularaemia from four to six or seven days after being bitten by the infected flies, and that of these fatally-infected animals one was bitten by a fly that had taken its own infective feed at least four days before.

iii. In laboratory experiments, rabbit lice (*Haemodipsus ventricosus*) taken from rabbits dead of the specific disease and placed on healthy rabbits conveyed a fatal infection to the latter in 20 out of 29 cases. (The nasal secretion and the urine of infected rabbits was also found to be infective when applied to the nasal mucosa or inoculated subcutaneously, but not when given in food). One successful transmission from squirrel to squirrel by squirrel-fleas (*C. acutus*) was also effected.

iv. In all of 10 experiments, bed-bugs (*Cimex lectularius*) transmitted tularaemia, by biting, from infected to healthy mice at intervals ranging from a few seconds to 71 days between the affluent and the effluent bite of infection; the virulence of the bacillus (*Bacterium tularense*) was not appreciably diminished by long sojourn in the bed-bug. White mice also become infected by eating infected bugs, but *not* by eating the fresh bug faeces, although the virulent bacilli are passed in the insects' faeces for a term of at least 120 days, and retain their virulence after 20 days of drying.

v. In 12 out of 17 experiments, mouse-lice (*Polyplax serratus*) transferred from mice dead of tularaemia to healthy mice transmitted the infection. Crushed mouse-mites (*Liponyssus isabellinus*) also transmitted the infection, by inoculation, into healthy mice. The mouse urine was also infective by inoculation.

vi. *Bacterium tularense*, for the cultivation of which yolk of egg was supposed to be necessary, can be cultivated—though not copiously or in full virulence—on serum glucose agar, glucose blood agar, and blood agar; by addition of a piece of fresh tissue to any of these poor media their value is augmented.

vii. Besides the insects mentioned in previous papers *Stomoxys calcitrans* has been proved capable of transmitting the infection of tularaemia.

The present paper shows that the infection can be transmitted without any insect intermediary; it contains an account of the circumstances of infection of six men, all of them experienced in laboratory technique, who became infected merely by dissecting or handling infected rodents. It also contains brief clinical reports of these six cases; and an appendix dealing with the serology in detail.

The following are the summarized conclusions of the first part of the paper:—

"All of the persons (six) who have been intimately engaged during the past two years in the laboratory in handling or dissecting rodents infected with the Utah strains of *Bacterium tularense* have suffered an attack of tularaemia.

"The diagnosis in each of the six cases rests upon the occurrence of a febrile period lasting about three weeks, positive serum reactions for agglutination and complement fixation to antigens composed of *Bacterium tularense*, and the absence of febrile attacks in 100 other persons in the laboratory coming in casual contact with the infected rodents.

"Consideration must be given to the skin of the hands as a possible portal of entry of the infection in laboratory workers even in the absence of a local lesion or lymphadenitis.

"A second attack has recently occurred in Case 1 of the above series, two years and five months after his first attack. The second attack was associated with evident cracks on the fingers, on one of which there developed an inflammatory papule which was soon followed by enlarged, painful, and tender lymph glands in the epitrochlear and axillary regions of the corresponding side, but without fever or other constitutional disturbance. *Bacterium tularense* was isolated from the papule by guinea-pig inoculation.

"The absence of constitutional symptoms in the second attack, although there was a local lesion and consequent lymphadenitis, is accounted for by the persistence of immune bodies acquired by the first attack.

"Unrecognized cases of tularaemia probably occur in the known foci of infection in the United States, some of which may have febrile attacks without local lesions, while some may have local lesions and a secondary regional lymphadenitis without very notable constitutional disturbance.

"Routine serological tests for agglutination expecially and for complement fixation using antigens composed of *Bacterium tularense* would probably not only detect cases in known foci of infection, but would bring to light unknown foci. Positive serological reactions are known to persist for two years after an attack. Light might be thrown upon the etiology of some fevers of undetermined origin.

"A warning is sounded against unwarranted indifference to an infection, which, in our experience, has claimed all of those who have persistently worked with it in the laboratory."

The clinical reports disclose a definite type of fever, which may be characterized as follows :—Sudden onset with headache, backache and multipresent shifting pains, remarkable lassitude, and fever. The fever lasts for about three weeks, the extreme range of temperature above the normal being about 3½° F. (in one case it reached 104·2°), with a remarkable temporary subsidence to, or nearly to, normal on the 3rd–4th (in one case the 6th) day. The shifting pains may start by radiation from some particular point ; they continue for two weeks to a month, but localized pains of some sort may recur or persist for about 12 months afterwards. In one case that began with dizziness there was rhinitis and occasional slight epistaxis instead of the usual pains. The weakness and languor persist for weeks, and it may be months before the health regains anything approaching its normal vigour. In none of the cases was the infection an inoculation ; but in one case reinfection by inoculation did occur two years after recovery from the first infection, and in the second attack (reinfection) the effects were purely local, namely, an inflamed papule and localized lymphadenitis.

A. A.

i. FRANCIS (Edward). **Tularemia Francis 1921 : A New Disesae of Man.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 8. Vol. 78. No. 14. pp. 1015–1018.

ii. O'MALLEY (John J.). **Tularemia Francis 1921, developing in a Laboratory Worker.**—*Ibid.* pp. 1018–1020. With 1 chart in text.

i. This paper gives a connected account of the long series of observations and experiments already summarized above. It gives a definition of tularaemia as a specific infectious disease, due to *Bacterium tularense*, transmitted from rodents to man by the bite of an infected bloodsucking insect or by the handling and dissection of infected rodents.

The rodents that have been found infected in nature are the California ground squirrel (*Citellus beecheyi*), the ground squirrel of Utah (*C. mollis*), the cotton-tail rabbits of Southern Indiana, and the jack rabbits of Utah.

The insects known to be capable of transmitting the infection are *Chrysops discalis*, *Stomoxys calcitrans*, *Ceratophyllus acutus*, *Cimex lectularius*, *Polyplax serratus*, and *Haemodipsus ventricosus*, the first four of which bite both rodents and man.

Human cases hitherto observed have occurred in the summer, the season of *Chrysops discalis*.

ii. This paper contains an account of a case of tularaemia, contracted from close contact with infected laboratory material, which was at first thought to be a case of atypical mild typhoid. It is prefaced by an historical account of the *Bacterium tularense*, beginning with McCoy who, in 1911, encountered an infection which produced in guinea-pigs pathological changes almost indistinguishable from those caused by *Bacillus pestis*, and, in 1912, in collaboration with CHAPIN isolated a very small, rod-shaped, apparently encapsulated, non-motile gram-negative organism, staining very well with anilin gentian violet, carbolthionin, and carbolfuchsin, but ill with Loeffler's methylene blue, and named it *Bacterium tularense*. The organism does not grow on the ordinary laboratory media, but grows well on a medium of coagulated egg-yolk diluted with 20 per cent. of water or milk sterilized for half-an-hour at 70° C., with a second heating for half-an-hour at 72° C.

A. A.

WRIGHT (Robert E.). **Keratomalacia in Southern India.**—*Brit. Jl. Ophthalm.* 1922. Apr. Vol. 6. No. 4. pp. 164–175.

This paper opens with a discussion of experimental xerophthalmia as seen in animals. The condition is due to deficiency of fat-soluble A vitamin and is readily cured, provided that blindness has not already supervened, by exhibiting butter fat or cod liver oil. " Considerations of the various opinions recorded give the impression that there is a certain amount of confusion as to the relation between keratomalacia in man and that of animals, and also between the different conditions described under this title in man."

To render confusion less on the human side of the condition, the author describes his experiences with keratomalacia in Southern India, together with a valuable note on the subject by Colonel KIRKPATRICK. Apart from the eye condition, which is described in detail, constitutional signs are present such as diarrhoea, wasting, jaundice, and sometimes enlargement of the liver. It appears that the keratomalacia of human beings is more complex than that experimentally produced in animals, and it does not respond to feeding with foods rich in fat-soluble A vitamin as does its counterpart. Treatment is slowly successful along the lines of local applications to the eyes and administration of cod liver oil, liver, thyroid extract and salts. " The prognosis as regards sight is bad if both corneae are attacked before treatment is commenced." The prevention of the disease is a matter of economics rather than of medicine.

A. D. Bigland.

BOOK REVIEWS.

CASPARI (Wilhelm) & SCHILLING (Claus). **Ueber den Stoffwechsel der Europäer in den Tropen.** [The Metabolism of Europeans in the Tropics.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920–1921. Vol. 91. pp. 57–132. With 10 text figs.

The present paper is not pathological and does not deal with tropical diseases which for so long rendered hot climates the "white man's grave," but treats of the metabolism of healthy Europeans in the sultry regions of Africa. We know by experience that, provided they escape the ailments peculiar to the tropics and adjust their habits to local conditions, Europeans are well able to adapt themselves to their altered environment and can continue to live there for the usual span of life. This paper confirms this generally accepted thesis by accurate, painstaking and tedious observation.

The three subjects of the experiment were Professor Schilling himself, a powerfully built man of 36, who had resided for varying periods four times before in the tropics, another hefty young man *aet.* 30 who had never been there before, and an assistant in the Customs who had been there many years and was thoroughly habituated to tropical life. His age is not given, but he is spoken of as a big, "pretty fat" individual who took but little exercise. The first and the last on the list had had malaria, but all were in good health at the time of the observations. These seem to date back as far as 1907–10 and were carried out partly at Berlin, except in the third subject, and partly in Africa. The Berlin observations are taken as the control. Those in Africa were carried out partly in the interior and partly on the coast, where the moist heat renders the conditions of life more trying. The results in all the cases were practically identical. As usual in metabolism experiments the food was weighed and analysed. The excreta were similarly examined and the results set out in tables and with meticulous attention to detail; the climatic conditions are similarly dealt with at length. The net result may be put very briefly, namely, that the subjects of the experiment remained in good condition and utilized their nourishment equally well in Africa as they did in Berlin; in work periods in both places the utilization of nutriment was similarly increased.

A curious point is noticed which is left unexplained, namely, a loss of weight in the experimental periods both in Berlin and Africa, both during rest and activity. The total daily intake of food (the usual mixed diet) during the experiments in Berlin gave an energy value of nearly 5,000 calories, and in Africa of nearly 4,000. In the latter meat does not appear on the menu (p. 67) but this may be an omission, for meat is alluded to later as part of the diet, in some observations at any rate. They evidently "did themselves very well"; one may suspect they did themselves even better in non-experimental periods, and the comparative moderation in intake during the actual experiments may have accounted for the loss in weight. They are stated to have rapidly recovered their weight when the restrictions during the experiment were removed. They are stated to have had rather poor appetites, to have partaken freely of water, especially in the damp heat, and this they lost readily through the skin. Pulse, body temperature, and evacuation of the bowels, remained normal throughout. Alcohol (beer) was taken in moderation, mainly for its "psychical" effect. Excess in the use of alcohol is highly reprehensible, especially in hot climates.

Of the protein intake, from 86–92 per cent. was utilized, the lower figures being in observations on the coast during rest periods; of the fat (mainly salted butter) the utilization figure was more constant (96–97 per cent.); of the total calories from 94–96 per cent. These figures were about the same as in the Berlin observations, and compare favourably with those recorded by EIJKMAN for Malayan subjects.

Thus, life in the tropics is bearable and should be perfectly healthy. The observations are only on three individuals, but they tally, as said before, with what is known by everyday experience in those who live wisely.

W. D. Halliburton.

WATERS (Ernest E.) [M.D. (Edin.), M.R.C.P. (Lond.), Lieut.-Col., I.M.S.; Supt., Presidency General Hospital, Calcutta]. **Diabetes: Its Causation and Treatment with Special Reference to the Tropics.** 2nd Edition.—ix+276 pp. With 8 charts and 1 coloured plate. 1922. Calcutta & Simla: Thacker, Spink & Co. [Price 15s.]

The first edition of this book was rapidly sold and, for nearly two years, had been out of print when Lt.-Colonel Waters was asked to prepare the volume now reviewed. With the passage of time the book has increased in size and in price—doubled in both instances. Increase in size is due to the incorporation of new cases and several complete and modern " tables " of food analyses. The first edition was fully reviewed in this *Bulletin*, Vol. 11, p. 470.

The Allen and Joslin treatment by fasting still holds out hope, as shown by some of the cases treated by Colonel Waters. Where the glycogenic mechanism is merely strained re-education may be possible, but it is difficult to believe that damaged tissue, whether nervous, pancreatic or hepatic, can be repaired during short fasts. Dr. JOSLIN has given up the use of alkalies during diabetic coma; indeed he believes them to be dangerous, an opinion not generally held. Of drugs opium, with purgatives when necessary, maintains its place. Not only does opium control the nervous symptoms, but as shown in Case IV, p. 198, it may enable the patient to bear the discomfort of the necessary fasting periods. Colonel Waters has treated boils and carbuncles with colloidal tin and palladium. A crop of boils vanished under treatment with colloidal manganese. Attention is drawn to the desirability of care of the teeth. Daily exercise is also insisted on. In the chapter on " Prognosis and Treatment " the mortality statistics are still from outside the tropics. JOSLIN's table, 1894–1915 gives deaths without coma, 147; with coma, 273, the direct opposite of what occurs in both east and west tropics where coma is not very common. The typographical defect noticed in the 1st Edition is less in evidence but there are still a few letters in " abnormal attitudes."

J. H. Tull Walsh.

LUCIE-SMITH (J. D.) [Editor]. **A Text Book for Teachers of Hygiene. Malaria, Hookworm, etc.** [Explanatory Preface by GIFFORD (L.).] —51 pp. 1921. Government Printing Office, Kingston. [Price not stated.]

This somewhat ambiguously intituled book—it is little more than a pamphlet—is meant for the guidance of teachers in elementary schools: it consists of short essays and lectures, supplemented and reinforced by aphorisms and precepts, and, besides the simple principles of hygiene, includes in its scope malaria, hookworm, and the subject of venereal disease.

The essay on the general principles and practice of personal and domestic hygiene, by the Rev. W. GRAHAM, is pithy and very much to the point; and that by Miss CARRINGTON on the same subject has the merit from the educational standpoint of recognizing that out of the heart are the issues of life. Dr. D. J. WILLIAMS imparts in simple language information on the causes, direct and contributory, of consumption, typhoid fever, diphtheria, yaws, and malaria, and explains the general precautions that may be taken against these infections; and Dr. B. E. WASHBURN does the same for hookworm, but goes into more detail with regard to its effects and its treatment. The subject of venereal diseases is treated by Dr. TAYLOR-PENGELLY and Messrs. ROSE and LAWRENCE. Dr. TAYLOR-PENGELLY deals in a few words with the delicate matter that brought such trouble to Eve and Adam long ago, and goes on to explain how venereal diseases are contracted and what their effects are; Mr. ROSE speaks to boys, in graphic language, of the effects of venereal disease and of the necessity of prompt confession to the medical man; Mr. LAWRENCE suggests the way in which the subject might be broached to girls.

A. Alcock.

WOLBACH (S. Burt), TODD (John L.) & PALFREY (Francis W.). **The Etiology and Pathology of Typhus. Being the Main Report of the Typhus Research Commission of the League of Red Cross Societies to Poland.**—pp. x + 222. With 34 plates and 13 figs. 1922. Published by the League of Red Cross Societies at the Harvard University Press, Cambridge, Mass. [Price 35*s.*]

This work is the main report, published in book form, of the Commission sent in 1920 by the League of Red Cross Societies to Poland for the purpose of making researches upon typhus. It is stated in the introductory chapter that "the determination of the specific cause of the disease was held as the most important goal," and, as the main result of their investigation, the Commission arrive at the definite conclusion that the specific cause of typhus is *Rickettsia prowazeki.* The observations and arguments on which this conclusion is based may be presented in summary form as follows:—

1. As an essential preliminary, a supply of lice was obtained from typhus-free localities, some from Montreal, others from London, the latter being part of a stock that for over two years had been under observation and known to be free from rickettsia. At the outset of the research a large number of control examinations of smears and serial sections were made with uniformly negative results.

2. The lice, enclosed in suitable boxes, were fed on cases of clinically well-established typhus, selected from patients admitted to the St. Stanislaw Hospital at Warsaw, and removed to special observation wards which were reserved in the hospital for the exclusive purposes of the Commission. Cases were chosen with a view to including both early and severe types of the disease. As a result of the feeding experiments the lice in a large proportion of the boxes became heavily infected with rickettsia. The experiments were not uniformly successful; observations were made with 52 boxes, and only in 27 of these were the lice found to be infected; but as, in the course of the research, the most favourable conditions as regards temperature and routine of feeding became known, so the incidence of infection rose, and of the last 21 boxes a positive result was obtained in 18, *i.e.*, 86 per cent.

3. Examination showed that the infection of the louse was limited to the alimentary tract below the oesophagus, and that the rickettsia bodies were wholly intracellular, the diseased epithelial cells being greatly distended, often protruding into the lumen of the gut, and closely packed with parasites. A marked degree of pleomorphism was observed in the rickettsia, elongated bacilliform and filamentous forms being present, in addition to the more usual small coccal forms. Mainly on account of their intracellular location and pleomorphic character, the bodies were identified as *Rickettsia prowazeki.*

4. Emulsions were then made of the viscera of infected lice, and injected into the peritoneum of guinea-pigs, one louse being used for each guinea-pig, with the result that, after an incubation period of 7–13 days, the guinea-pigs developed a short febrile illness which was regarded, for reasons to be stated, as typhus. Every one of nine guinea-pigs treated in this way

became pyrexic, and in eight of these further investigations were made by which it was established either (*a*) that a state of immunity had been induced against the effects of inoculation with blood taken from patients ill with typhus, or (*b*) that subinoculation of other guinea-pigs produced a febrile disorder, similarly followed by a state of immunity against human typhus, or (*c*) that histological lesions were present in the brain and tissues essentially similar to the lesions found after death in human subjects, and regarded by the authors as peculiar to the disease. In each guinea-pig of the series a positive result was obtained with one or more of these control tests, and it was therefore concluded that the febrile reaction to the injection of rickettsia-containing lice was typhus.

5. Other guinea-pigs were injected with lice in which no rickettsia were found, with the following results:—(*a*) Some of the lice had been taken from " positive " boxes, *i.e.*, boxes containing other lice infected with rickettsia; of 13 guinea-pigs inoculated with these lice four developed a febrile illness which, on the above criteria, was regarded as typhus, while seven remained well. (*b*) Other lice were taken from " negative " boxes, the contents of which were wholly free from rickettsia. In 12 such cases not only was no fever produced, but by subsequent inoculation with blood from typhus patients it was shown that the guinea-pigs had acquired no degree of immunity. There remain four experiments, the results of which, although the guinea-pigs did not develop typhus, were for various reasons regarded as open to question, and are therefore best left out of account.

6. Histological investigations on the human subject were made in a large number of cases. These comprised (*a*) the examination of portions of skin excised during life (28 cases), and (*b*) post-mortem observations. The importance of examination as soon as possible after death is emphasized, and in 16 of the cases the autopsy was made within two hours of death. Lesions are described in the skin, central nervous system, and elsewhere, which the authors regard as peculiar to the disease. In the skin, changes were observed as early as the first day of the rash, consisting of swelling of the endothelium of capillaries and other minute vessels, and an accumulation of polymorphonuclear leucocytes in the adjacent connective tissue. At a later stage compact " typhus nodules " were observed, lymphoid and plasma cells, mast cells, and polymorphonuclear corpuscles entering into the composition of the nodule, at the centre of which a small vessel was usually distinguishable, containing thrombus adhering to the wall or blocking the lumen. In the brain, similar small tubercle-like lesions were found to be composed of two elements, some of the cells being derived from vascular endothelium, others from a neuroglial proliferation. Stress is laid on the vascular origin of all these lesions, and in many instances the swollen endothelial cells presented a granular or stippled appearance, which is attributed to the presence of masses of rickettsia bodies. In view of the possibility of mistaking various kinds of granules for rickettsia, great importance is attached to the localization of these bodies in the endothelial cells, the protoplasm of which is normally non-granular except during the process of cell-division. The conclusion is drawn that the tissue changes leading to the formation of the " typhus nodule " are the direct result of the invasion of vascular endothelium by rickettsia. It may be remarked in this connexion that the endothelial cells are not, under the circumstances, in a normal state, but, apart from the possible presence of parasitic bodies, are undergoing intrinsic activities that might be expected to cause a deviation from their usual hyaline appearance.

Rickettsia-like bodies were found in 21 of the 28 specimens of skin removed from living patients; of the post-mortem material, these bodies were demonstrated in the skin of 25 cases, the brain of seven, the testes of five, kidneys of two, and femoral vein of one case.

7. Lesions in all essential respects identical with those in human beings were found in guinea-pigs, though relatively the brain lesions were more conspicuous and the cutaneous lesions less so than in man. The presence of rickettsia-like bodies was less constantly established, a circumstance

which is attributed partly to the fact that less time was given to the search, and partly to the short duration of the disease in the guinea-pig.

The ultimate conclusion of the authors is that *Rickettsia prowazeki* is the cause of typhus, which they regard as a disease primarily of the small vessels, in whose endothelial lining the parasite is almost exclusively located. The mode of conveyance of the virus from the louse to the human subject is left uncertain. In no instance were rickettsia observed in the salivary glands or oesophagus of the louse, and it is suggested that the parasites may escape from the louse in the faeces, and be introduced by scratching, or by the mouth parts of the louse which have become soiled with faecal material.

Whether or not the claim of the authors that the specific cause of typhus has been definitely determined be regarded as proved, the work of the Commission is of outstanding importance, and takes its place among the notable contributions to the pathology of typhus of recent times. The research is planned on carefully considered lines, and the results of the several experiments and observations are set out in clear detail, and their significance is discussed in a spirit of critical enquiry. The experimental evidence establishes a strong case in favour of the view that there is some association of a very close character between the virus of typhus and rickettsia bodies; but, in considering the case for the identity of the two, much depends on the nature of the granular structures described in the vascular endothelium. The authors are clearly alive to the possible fallacies in the interpretation of the appearances figured in the series of beautiful drawings and microphotographs which are appended in illustration of the text, and would doubtless readily admit that confirmatory observations are necessary before the identity of the intracellular granules with the virus of the disease can be regarded as definitely established.

An incident of considerable interest arose in the course of the research when Mr. Bacot, the entomologist to the Commission, whose recent death in the pursuance of further investigations on typhus we have to deplore, was taken ill with trench fever. The lice for whose nourishment he had been personally responsible thereafter became heavily infected with bodies which, from their morphology and extracellular location, were identified as *Rickettsia pediculi.* The Commission regard these as identical with *R. quintana* and *R. wolhynica,* all three being forms that have been described by different observers as the causal agents of trench fever. The infected stock of lice was discarded from use for the purposes of the research.

A. G. Phear.

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PELLAGRA:
A CRITICAL REVIEW OF THE LITERATURE SINCE 1914.

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There can be no question that the study of pellagra is almost entirely centred in the search for the causation of the disease. Until more light is thrown upon this, one of the most fascinating problems in the whole realm of medicine, the question of prevention and cure of the disease must be vain. Indeed, new outbreaks of pellagra are examined purely in the hope that some hitherto overlooked factor in etiology may be discovered. No apology, therefore, is needed for limiting this review to a discussion of possible etiological factors and nothing more.

The old fight around the subject of maize as a cause of pellagra still continues, but upon wider lines. The old view that pellagra was due to maize itself, whether good or bad, has developed into the food deficiency theory, while the view that bad maize was the causal factor has been born again in the infection or toxin theory. The modern fight now rages with the same vigour, with the same bias as of old, but with more material in the shape of better and more widespread observations. It seems that the modern worker upon pellagra is almost forced to become an adherent of the " food deficiency " school or of the " infectious " school.

In a review such as this it is necessary to state first of all the case for each school without bias and to reserve criticism, as far as possible, till the end.

The Views of the "Food Deficiency" School.

To **GOLDBERGER** and **WHEELER** (1915) (1920) belong the credit of first setting the view that pellagra is a food deficiency disease upon a basis of experimental fact. The Rankin Farm experiment has become classic. Eleven convicts volunteered to subject themselves to a given diet deficient in animal protein in exchange for a free pardon. Within four months six, if not seven, of these men developed symptoms of pellagra. There appears now to be no doubt that the condition really was pellagra, in fact it is possible that **GOLDBERGER** has understated rather than overstated his case.

No less striking were the Institution experiments of GOLDBERGER, WARING and WILLETS (1915). Two orphanages, A and B, were selected, the former showing 79 cases of pellagra in the spring and summer of 1914, while the latter, during the same period, had 130 cases. In September, 1914, the diet was generously increased in respect of fresh meat and leguminous protein food ; milk and eggs also were used freely. In the following year there was no case of pellagra in orphanage A and only one in orphanage B. Similar results were obtained in an asylum. In this case there were 72 pellagrins in one year and no recurrence of the disease in the following year after the diet had been altered. But of 32 control pellagrins kept upon the old diet 15 presented recurrences. Another very striking observation, which has not received the attention it deserves, was made by the same workers (1914), viz., that no man in the army of the United States or of Italy has ever developed pellagra unless the disease was present before enlistment. The late Dr. SANDWITH was of the opinion that the same was true of the Egyptian army. The assumption, of course, is that the good and regular feeding of the army is prophylactic against the disease.

With the war came fresh outbreaks of pellagra, and with them came much new work and renewed enthusiasm. The epidemic among Turkish and German prisoners of war in Egypt was especially interesting in this respect, and without doubt the observations it called forth rank second only in importance to the pioneer work of GOLDBERGER. It is not necessary to deal in any detail with this outbreak ; suffice it to say that among Turks up to the end of 1919 there had been 9,257 cases of pellagra among a total of 105,468 prisoners, while among the Germans there were 79 cases out of 7,600 men. During 1919, though the disease had greatly declined and many of the prisoners had been repatriated, there were 1,617 deaths, of which six were in Germans.

Out of the enormous volume of work done during this outbreak, both by individuals and commissions, the name of W. H. WILSON emerges supreme. Without his splendid assistance the significance of the epidemic as regards the etiology of pellagra would have been lost. WILSON's contribution (1921) to the subject may be given as follows: (the words are taken from the reviewer's abstract of WILSON's paper) " The sufficiency of protein must not be reckoned by its gross weight, but by its assimilable value. In other words, the important factor is the biological value of the protein. Proteins differ considerably in their biological value. For estimating the comparative value of a given amount of protein one has to divide the total quantity by one of the following factors :—Animal protein, 1, rice protein, 1·12, potato, 1·27, pulse, 1·82, wheat flour, 2·55, maize, 3·4. Thus a man weighing 70 kilos, to maintain his nitrogenous equilibrium, must take 30 gm. of protein daily if he take meat as his source, but 102 gm. of protein are necessary if he consume the maize variety. The figure 40 may be taken as the minimum of safety for the biological value of protein, though many healthy individuals may escape disease with a B.P.V. of only 20. When hard labour is indulged in 50 would be a safer figure, and for a community with chronic intestinal disease, or one previously affected with pellagra, a figure even of 60 is not too high."

Upon these conclusions WILSON proceeds to examine the diets during the exhibition of which pellagra has occurred. Thus in the Rankin Farm experiment the biological value of the protein was only 1·46. In the outbreak among Armenian refugees at Port Said the diet had a B.P. value as follows :—for males (fifteen years and upwards), 23 ; for females (fifteen years and upwards), 18·4 ; for children (five to fourteen years), 13·8 ; for children up to four years, 7·3. The disease practically disappeared on a diet the B.P.V. of which was 43·7 for the healthy and 59·15 for those who had suffered from pellagra or were ill-nourished.

For Turkish prisoners of war in Egypt the diet apparently responsible for a large number of pellagrins had a B.P.V. of 33·5 for the non-labour group and 36·8 for the labour group. Many other diets are discussed which seemed very poor and yet it was found that pellagra did not develop in those subsisting upon them. All had a B.P.V. of over 40.

As pointed out by WILSON, a deficiency of protein may take place in one of four ways: " (1) Absolute deficiency of intake below the normal requirements. (2) Deficiency relative to individual or energy requirements. (3) Deficiency due to low availability of protein resulting from the nature of the food or defective preparation. (4) Secondary deficiency due to excessive bacterial destruction of protein in the intestine or defective powers of digestion or assimilation."

As regards the part played by accessory food substances nothing very definite has transpired. McCOLLUM and SIMMONDS (1917) have pointed out that in GOLDBERGER's diet there was a deficiency of certain inorganic salts as also of fat-soluble vitamin. Other workers have attempted to trace a possible connexion between the absence of vitamins and pellagra, but the evidence is not convincing.

The modern tendency is to regard the biological value of any protein as dependent upon the amino-acid grouping in that protein. GOLDBERGER and TANNER (1922) have developed this idea. It may be that the reason why pellagra is so common in maize-eating countries is because maize protein—zein contains no tryptophane and no lysin. WILSON has pointed out that indican in the urine (so commonly in excess in pellagrins) must be derived from the tryptophane in the food protein. If, therefore, the supply of tryptophane to the body is small, and that little used up by putrefactive organisms and converted into indican, it is evident that at least one amino-acid grouping is being assimilated very little, if at all.

Let these remarks close the case for the " food deficiency " school.

The Infection or Toxin School.

The views held by the members of this school are very much more difficult to describe for the simple reason that no two members hold similar views as to the exact organism or toxin supposed to be the cause of pellagra. Perhaps the easiest method to pursue is to take the views held by different observers or groups of observers separately.

The Simulium theory of SAMBON (1910) (1913) has apparently died a natural death. So many cases of pellagra have been described in which no possible contact with any such fly can be traced that we can now neglect it. Nevertheless, SAMBON has done useful work in pointing out that the periodicity of pellagra, as also its symptoms, course, duration and its pathological and post-mortem findings, strongly suggest a parasitic origin. Undoubtedly too, pellagra does appear to manifest itself in certain definite regions but this fact may be explained by the assumption that similar conditions of diet, etc., will naturally obtain in similar places quite apart from any parasitic infection.

Rickets, for example, does favour certain areas, but nobody has suggested its infective origin on that account.

The view of ALESSANDRINI and SCALA (1913) that pellagra is due to Colloidal Silica in water does not deserve further comment.

The work of SILER, GARRISON and MCNEAL (1914) (1917) certainly merits discussion. These workers were members of the Thompson-McFadden Pellagra Commission which began its observations in South Carolina in 1912. After most careful and systematic search they came to the conclusion that pellagra was spread from case to case by direct infection. Speaking of two small towns in South Carolina where pellagra is rife they stated that " since 1914 practically all the new cases of pellagra in that community developed while the person was residing in the same house with, or next door to, a pellagrin in the active stage of the disease, or within six months after such exposure." In their various other reports similar views are stated and substantiated. As regards the mechanism of spread at first it was thought that the stable fly, *Stomoxys calcitrans*, was responsible. Later, the possibility of sewage playing a part became more probable. In some districts it was found that installation of a proper sewage system " almost wholly " arrested the disease. The question of diet in South Carolina was not neglected. It was found that only 1·37 per cent. of villagers who drank milk developed pellagra. Again 4·88 per cent. of those who eat fresh meat every day became pellagrous, and only 1·37 per cent. among those who eat no meat at all. Daily administration of milk and eggs was insufficient to protect against the disease.

Naturally the possibility of intestinal parasites and bacteria playing a role in pellagra etiology has been received by many as a certainty. Many and divers worms and other intestinal flora and fauna have been blamed, but for the most part the charge against them has not been maintained because they are also common dwellers in the intestines of those who are not pellagrins. Perhaps the only individual group which need seriously be considered is the *B. Welchii* and its relations. HOLMES (1916) reported the presence of large numbers of these organisms in pellagrous stools, and MARETT (1920), working at the pellagra outbreak amongst Turkish prisoners of war in Egypt, found a similar state of affairs. MARETT found that cultures taken from the stools of definite pellagra cases and from the small intestine post-mortem showed in 90 per cent. of the cases organisms undistinguishable from *B. Welchii.* Stools from healthy Turks did not show these anaerobes. While these observations are undoubtedly important the fact must not be lost sight of that, as MCCARRISON has shown, intestinal troubles of various kinds may be actually produced by certain diet deficiencies alone.

It has been stated that maize and maize flour obtained from an endemic centre of pellagra in Egypt contained anaerobic, spore-bearing organisms.

Another aspect of the infective theory has been discussed by Seale HARRIS (1919). This writer stated that during the great war nature subjected the inhabitants of Europe to an exactly similar dietetic experiment as that of GOLDBERGER and his eleven convicts at Rankin Farm. The similarity, however, proved to be only upon the surface, for in those countries where pellagra was unknown, or very rare, practically no outbreaks occurred, while in those countries, like Italy, where the disease was rampant before the war the numbers of pellagrins did not increase but even showed a marked decrease. HARRIS is of the opinion that GOLDBERGER's experiment has been repeated upon an enormously greater scale without a similar result. This is in favour of the infective origin of pellagra.

Against the views held by the "Infective" school the rival faction has risen up in arms. In 1916 GOLDBERGER instituted a remarkable experiment in which 16 persons, including one woman, ate the scales, urine and faeces derived from pellagra patients. They were also injected intra-muscularly and subcutaneously with pellagrous blood, and pellagrous secretions were applied to the nose and nasopharynx. These heroic experiments were carried on for a period ranging from 4½ to 6½ months. Not one of the 16 persons developed pellagra.

Not content with this, GOLDBERGER, WHEELER and SYDENSTRICKER (1920) studied the condition in South Carolina where the Thompson-McFadden Commission did its work. Here, in opposition to the latter's conclusion, it was found that the diet of pellagrous households was deficient in protein, in vitamins A and B, and in mineral constituents. It was also discovered that "in general pellagra incidence was found to vary inversely to family income."

Mention, too, must be made of the poor and indefinite results obtained in the attempt to transmit experimentally pellagra to animals. All sorts and conditions of animals have been subjected to experiment, but the most that can be said is that in a few instances symptoms somewhat resembling pellagra have been produced.

One of the strongest arguments used against the infective nature of pellagra is that in no recorded case has it been shown that any person attending pellagrins in hospital or elsewhere has contracted the disease. A possible exception to this came under the reviewer's notice in England a short time ago. A lady who had been healthy all her life and living under the best conditions during three springs in succession became ill, lost her appetite and suffered from various gastro-intestinal and nervous symptoms. One spring a typical pellagrous dermititis appeared together with all the usual symptoms of the disease. The husband of this lady works in a large asylum close by which, so far as the knowledge of the reviewer goes, is the only endemic centre of pellagra in the country. It is strange that this case should have developed in this neighbourhood just where, if infection is present, it should have occurred. This case may be only a coincidence; on the other hand it may not.

It is extremely difficult to account for the sporadic cases of pellagra which occur in the British Isles from time to time on the assumption that the disease is an infection.

Discussion of Pellagra Etiology.

The reviewer has done his best to recapitulate without bias the views of the two schools of pellagra etiology. There now remains the infinitely more difficult task of attempting to assess the value of the respective views. In the first place one fact must be clearly appreciated, viz., pellagra is a disease of almost infinite variation. Those who have lived among pellagrins for many months, as the reviewer has, must be struck by the extraordinary difference in the severity of the disease presented by different cases. There is as much, or greater, difference between a slight cold in the head and heliotrope influenza as there is between a mild and a severe case of pellagra. So obvious is this that immediately the question arises, is pellagra a clinical entity at all? Is it not merely a syndrome and therefore capable of being brought about by more than one cause? A study of the disease clinically must compel us to answer these questions in the affirmative. At least three different grades of the disease may be recognized: (1) Where there is mere protein starvation. As a type of this variety the case of the small Arab boy described by WILSON may be taken. Here the addition of one egg a day was sufficient to bring about a cure. It is probable that GOLDBERGER's convicts in the Rankin Farm experiment also belonged to this class. (2) The second grade is one in which the patient has lost his nutritional balance, as it were, but by careful and prolonged treatment this is regained. In this variety it is possible that as the result of protein starvation, or some other food deficiency, organic defects in the intestine have taken place which render the assimilation of the diet supplied inadequate. That these defects are not permanent is shown by the fact that the balance of nutrition is slowly regained and the patient recovers from the attack. On the other hand it may be argued that some weakness remains, since such patients are always liable to relapse in the corresponding season of the following year. Where this weakness lies and what its nature may be defies imagination. That it does exist is only too obvious in the experience of pellagra observers. (3) The third grade is that in which the food deficiency, as it were, comes from within. The defect here is not in the diet intake but in the assimilation of the diet, however generous in itself. This assimilation defect must be due either to some alteration which occurs in the food during its passage through the body or to some inability on the part of the body cells to deal with it. It is in this class of case, unfortunately not rare, where treatment of any kind seems to be of no avail. The patient day by day slowly slips down the hill until he approaches his end, which is sometimes so indefinite that it is difficult to say the exact moment when death has actually taken place.

'Such grades of pellagra, for a knowledge of which we are largely indebted to WILSON, must appeal to clinical workers in whatever part of the globe their observations of the disease may take place. If it be clearly understood that pellagra is a syndrome of complex etiology and not a clinical entity due to a single causal factor much will have been attained. What would we now think of observers who in years gone by considered jaundice to be a clinical entity? With what shame would we regard the petty quarrels between the obstructionists and the non-obstructionists, between the holders of the infective view and the mechanical view?

Modern work on pellagra has apparently brought us to this stage. Many are the problems which still await solution. There still remains the problem of the connexion between pellagra and such diseases as war-oedema and acrodynia and the question whether much chronic but slight ill-health is possibly a first and unrecognized stage of a food deficiency which never advances far enough to disclose its real nature. In conclusion let us think of a disease such as phthisis. As its name implies it was and is regarded as a wasting. The discovery of the tubercle bacillus by KOCH proved beyond doubt the specific cause of the disease and yet the clinician cannot allow himself to lose sight of the fact that it is also a nutritional disorder. It may be that in the future some such dual explanation will be found to account for the more severe grades of pellagra. By considerations such as these it is hoped that the *raison d'être* of the two rival schools will be removed and that further progress will be along a line common to both. As so often happens in human affairs wherever two schools arise with totally opposite views on any subject the whole truth will be found with neither. It is probably as untrue to say that all cases of pellagra are due to food deficiency as it is to say that all cases are due to infection.

The reviewer has attempted to occupy what the rival schools would regard as no man's land—a dangerous position. Whether truth lies here the future alone can show.

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MEDICAL ZOOLOGY.

FAUST (Ernest Carroll) & WASSELL (Corydon McA.). **Preliminary Survey of the Intestinal Parasites of Man in the Central Yangtze Valley.**—*China Med. Jl.* 1921. Nov. Vol. 35. No. 6. pp. 532–561. With 1 map in text.

The survey was evidently sustained with method and care, and its scope included observations of domestic animals that serve as reservoirs or as intermediate hosts of human parasites. The following species are recorded :—

Entamoeba histolytica is very common ; foreigners are more subject to acute infections than natives ; *E. coli* is usually associated ; in many cases the whole nuclear detail of the two species has been made out in freshly passed material. Other species of Protozoa found are *Endolimax nana, Trichomonas hominis, Cercomonas longicauda* (once), *Giardia intestinalis, Embadomonas sinensis*, n. sp., *Balantidium* sp., smaller than *coli.* Trichomonas is very common but is usually found in stools that are not normal. Embadomonas was observed in nine patients with diarrhoeic stools. Giardia is considered to be definitely pathogenic, and to yield to oil of chenopodium. *Spiroschaudinnia eurygyrata* has been observed in diarrhoeic stools, in association with some of the species mentioned above.

For some undiscovered reason Cestodes are remarkably uncommon. *Diphyllobothrium mansoni* was found once, and the related species in the dog and cat is also uncommon ; *Taenia saginata* once and eggs of a Taenia once ; none of the dogs examined had *T. echinococcus* ; eggs of *Hymenolepis nana* in four cases ; *Dipylidium caninum* not observed in man, but found in dogs and cats.

" Domestic animals are, on the whole, more heavily infected with human flukes than man himself, and are the true reservoir," as, perhaps, too few clinicians realize. The following Trematodes are noticed : *Fasciola hepatica* common in sheep, and *F. gigantica* in local bovines ; *Fasciolopsis buskii* ; *Paragonimus ringeri* ; *Clonorchis sinensis* common in dogs and cats ; *Metagonimus yokagawai* once in cat ; *Echinochasmus* spp. in dogs and cats ; *Schistosoma japonicum*, but no cercariae found in any snails examined.

The following Nematodes are recorded :—*Ascaris lumbricoides* (the commonest), *Ancylostoma duodenale* and *Necator americanus, Trichuris trichiura, Strongyloides stercoralis, Filaria bancrofti, F. circumocularis, Oxyuris vermicularis, Gnathostoma spinigerum* in a cat, and a related species in a dog.

Gigantorhynchus gigas is common in hogs.

In comparing this survey of the Central Yangtze Valley with MAXWELL's survey in Fukien, the authors remark that while the two areas agree in climate and in the habits of the population, only part of the parasitic fauna of man (and reservoir animals) is common.

A. Alcock.

NEDERGAARD (N.). **Intestinal Parasites in Eastern Cuba.**—*Southern Med. Jl.* 1921. Dec. Vol. 14. No. 12. pp. 971–973. With 3 text figs.

The survey extended over 12 months. The number of admissions to hospital was 5,613, the majority being males between 15 and 40 years. The number of "stools examined" was 3,945; Ancylostoma and

Necator were found in 1,636, Ascaris in 780, Trichocephalus in 1,341, Strongyloides in 183, Trichomonas in 195, *Entamoeba histolytica* in 25, *Balantidium coli* in 24, *Entamoeba coli* occasionally, Prowazekia once.

A few cases of mild diarrhoea were observed of which the only evident cause was *Balantidium coli*; after one or two doses of mag. sulph. or ol. ric. both diarrhoea and Balantidium would disappear. Many cases of malaria with concurrent hookworm did not respond to anti-malarial treatment until the hookworm infection was treated.

A. A.

YOUNG (C. J.). **Human Intestinal Protozoa in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 93–98.

This paper records the results of examination of faeces (one stool in each case, and one specimen of it unless to settle a doubtful point) of 500 residents of Manaos, of whom 249 were children of school age, and 251 were Federal troops. The following protozoon cysts were found:—

Entamoeba histolytica in 22·5 per cent. of children and in 27·5 per cent. of troops;
Entamoeba coli in 36·9 per cent. of children and in 38·6 per cent. of troops;
Giardia intestinalis in 14·0 per cent. of children and in 8·3 per cent. of troops;
Chilomastix mesnili in 2·8 per cent. of children and in 4·4 per cent. of troops.

Entamoeba nana and *Iodamoeba bütschlii* were also found. *Trichomonas hominis* was not found in any of the 500 cases, but was detected in three hospital cases having diarrhoeic stools.

Blastocystis occurred in 36·1 per cent. of children and 48·2 per cent. of troops.

A. A.

BRUG (S. L.). **Quelques observations sur les protozoaires, parasites intestinaux de l'homme et des animaux.**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 132–139. With 2 text figs.

Here are described two new intestinal parasites—an Entamoeba and an Embadomonas (or "Waskia")—of the giant water-bug *Belostoma indicum*; also an amoeboid transformation in an altered environment (a strong decoction of "Irish Moss") of *Chilomastix mesnili* [apparently similar to the amoeboid transformation that occurs in the gorged choanocytes of sponges]; also a case—with a brief notice of two other cases—of autochthonous infection, in Java, with *Isospora hominis*. The described case of this infection throws no certain light on the pathology of human coccidiosis as it was complicated with other intestinal infections, but it appeared to end in "spontaneous" extinction.

A. A.

JEPPS (Margaret W.). **Notes on the Intestinal Protozoa of 917 Men at the University War Hospital, Southampton.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 366–375. With 1 text fig.

The majority of the 971 cases here analysed came from the various fronts in Europe, Asia, and Africa; a few were from Home stations. In 777 of them more than six stools were examined.

Of the 971 cases, 527 were dysentery patients ; 51, though suffering from other intestinal complaints, had a history of dysentery ; 159 were suffering from other intestinal complaints, without having any history of dysentery ; two were cases of liver abscess ; and 95 were a variety of other complaints, of which 25 had, and 75 had not, a history of dysentery.

Altogether 63·4 per cent. of these 971 cases were found to be infected with intestinal protozoa of one or more kinds. The specific infections discovered, and their several percentages, are as follows :—*Entamoeba histolytica*, 23·7 ; *E. coli*, 30·4 ; *Endolimax nana*, 28·6 ; *Iodamoeba bütschlii*, 3·1 ; *Dientamoeba fragilis*, 1·0 ; *Giardia intestinalis*, 13·2 ; *Chilomastix mesnili*, 6·5 ; *Trichomonas hominis*, 1·2 ; also a single instance of *Tricercomonas intestinalis*. (Incidentally, eggs of *Ascaris lumbricoides* were found in 4·7 per cent. of the cases, and of *Trichuris trichiura* in 15 per cent.).

Concentrating attention on *E. histolytica*, the percentages of infection for the several classes of cases are as follows :—In the 527 cases of dysentery, 26·5 ; in the 51 cases of other intestinal complaints, having a previous history of dysentery, 19·6 ; in the 159 cases of other intestinal complaints, not having any history of dysentery, 19·5 ; in the two cases of liver abscess, 50·0 ; of the 25 cases of other ailments, having a previous history of dysentery, 32·0 ; and of the 70 cases of other ailments, not having any history of dysentery, 20·0.

Of the 230 (23·7 per cent. of the whole 971) instances of *E. histolytica* infection, amoebae only were found in 17 and cysts in 213. In 99 cases the cysts were over 10μ in diameter, in 95 cases under 10μ, and in 19 cases both these kinds. Of the 99 cases passing only the larger cysts, 64 had been " in the East " ; of the 95 cases passing only the smaller cysts, 36 had been " in the East," and of the 19 cases passing both kinds, 10 had been " in the East." These observations are in accord with those of MACKINNON, which also suggest that amoebae that form large cysts are commoner " in the East."

A. A.

i. BOECK (William C.). **The Thermal Death Point of the Human Intestinal Protozoan Cysts.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 365–387.

ii. ——. **On the Longevity of Human Intestinal Protozoan Cysts.**—*Ibid.* 1921. Sept.–Nov. Nos. 5 & 6. pp. 527–540. With 1 text fig.

i. In determination of resistance, the cysts, after being strained out and washed, were placed with a small amount of water in serology test-tubes and exposed to gradual (2° C.) increases of temperature in a water bath for a term of five minutes at each increase. Neutral red solution was used for testing vitality.

The thermal death-point for the several species of cysts was determined to be as follows :—*E. histolytica*, 68° C. ; *E. coli*, 76° C. ; *Iod. bütschlii*, 64° C. ; *End. nana*, 64° C. ; *Giardia intestinalis*, 64° C. ; *Chilomastix mesnili*, 72° C. All these temperatures are, of course, subject to a correction of something inside 2° C.

ii. " Immersed in distilled water, contained in bottles and kept at a temperature of 12° to 22° C., cysts of *E. histolytica* were found viable at the end of 153 days ; *E. coli* at the end of 244 days ; *Giardia intestinalis* at the end of 32 days ; and *Chilomastix mesnili* at the end of 187 days.

"In eosin-stained wet preparations, sealed with vaseline, cysts of *E. histolytica* were viable at the end of 211 days; *E. coli*, 124 days; *Giardia intestinalis*, 66 days; and *Chilomastix mesnili* at the end of 232 days."

In all these experiments it is assumed that the cysts which did not stain with eosin, and showed little or no plasmolysis or loss of refractivity, were alive; this is the only criterion of vitality applied.

A. A.

Brug (S. L.). **Opzending van materiaal ter onderzoek op darmprotozoën.** [The Sending of Material to be examined for Intestinal Protozoa.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 574–577.

The necessity of examining always fresh material very often gives rise to difficulties in practice, especially if the samples have to be sent some distance to a laboratory. Wet fixation of slides in sublimate-alcohol is too elaborate.

The author recommends mixing 1 cc. of faecal matter with 10 cc. of iodine solution (I 1, KI 2, Aq. 100), and shaking the mixture for a few minutes. Bloody mucus is well dissociated in this way. Different stages of protozoa could be recognized after keeping the sample for at least a fortnight in a well-closed bottle. The suspension must be sifted through gauze, and it is often necessary to remove the iodine by treating the filtrate with 1 per cent. sodium hyposulphite (till the yellow colour has disappeared). After centrifuging the suspension the sediment can be examined.

The method was tried with good results in cases of infection with *Entamoeba histolytica* (all stages), cysts of *Endolimax williamsi* (iodine cysts) and cysts of Lamblia. Cysts of *Endolimax nana* could not be recognized after two days. The method has a few drawbacks (impossibility of examining in eosin, pictures different from the fresh protozoa), but it may be useful in certain circumstances.

W. J. Bais.

Yakimoff (W. L.) & Miller (G. A.). **Les protozoaires de l'intestin de l'homme en dehors de l'organisme de l'homme. L'examen de l'intestin du** *Periplaneta orientalis.*—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 8–9.

This paper contains statistics of the organisms found in the intestine of *Blatta orientalis* in an investigation of 124 specimens at Petrograd. The species found were *Nyctotherus ovalis, Entamoeba blattarum, Lophomonas blattae* and *striata*, Oecomonas, Monas, Spirochaeta, Spirillum, Blastocystis, and *Oxyuris diesingi.*

A. A.

Yakimoff (W.) & Kolpakoff (F. A.). **Les colites de l'homme dues aux Protozoaires.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 548–554. With 8 text figs.

Abstracts of ten cases of more or less acute dysentery among Russian soldiers, in which various protozoa were observed in, or cultivated from, the stools—namely, Prowazekia (five cases), Oecomonas (one case), Colpoda (two cases), *Uronema caudatum* (one case), *Entamoeba coli* (three cases), *Entamoeba dysenteriae* (one case). [The first four of these are either free-living forms or belong to DOBELL's coprozoic fauna, but the author considers that they play a part in the intestinal troubles noted.] "*Prowazekia Ninae Kohl-Yakimov*" and "*Pararhizomastix hominis*" are also described as intestinal parasites of man, the latter as a "new genus."

A. A.

CRAIG (Chas. F.). **The Differential Diagnosis of the Common Intestinal Amoebae of Man.**—*Milit. Surgeon.* 1921. Nov. Vol. 49. No. 5. pp. 513–527.

The three common species, *Entamoeba histolytica, E. coli,* and *Endolimax nana* (which last the author prefers to retain in the generic idea "Entamoeba") are here defined and compared in their free and encysted phases, and in their relations to their human host; and the methods of preparing them for examination in the living state, and of fixing and staining them, are described.

A. A.

COLE (A. F.). **Report on Differential Blood Counts and their Value in Protozoal Infections.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 450–452.

This report is based on observations of 120 cases of "pensioners drawing allowances for past infections with malaria (all types)." In 53 of the cases the percentage of large mononuclears was 8 or more, in 43 cases 10 or more, and in 23 cases 12 or more. Of 20 cases where counts were done at intervals and the patients were "presumed to be taking 10 gr. of quinine" daily in a single dose before breakfast, the percentage of large mononuclears actually increased in 10, remained constant in 2, and decreased in 8. Of three cases showing B.T. parasites at first blood examination, successive counts revealed a decrease of large mononuclears from 19 per cent. to 4 per cent. in one, an increase from 6 per cent. to 10 per cent. in another, and no change in the third.

The average differential leucocyte count of the 120 cases was as follows: polymorphonuclears, 61 per cent.; large mononuclears, 8 per cent.; all other mononuclears, 31 per cent. As regards the influence of quinine on the leucocyte count the author is disinclined to form any conclusions where no certainty exists that the quinine was actually taken.

The author's final opinion is that the large mononuclear count is of no real value as an indication of malarial relapse or latent infection.

Some "cases with dysenteric history" studied at the same time gave an average differential leucocyte count as follows: Polymorphonuclears, 60 per cent.; large mononuclears, 9 per cent.; all other mononuclears, 31 per cent. So that the author is of opinion, furthermore, that the percentage of large mononuclears is not necessarily high in undoubted cases of protozoal invasion.

A. A.

HEGNER (R. W.). *Cytamoeba bacterifera* **in the Red Blood Cells of the Frog.**—*Jl. Parasit.* 1921. June. Vol. 7. No. 4. pp. 157–161. With 8 text figs.

This paper is intended to call attention to the problematical parasite of the red blood cells of frogs described by LABBÉ.

A. A.

DESCHIENS (Robert). **Les entérites à** *Giardia* (*Lamblia*).—*Travail du Laboratoire de Parasitologie de la Faculté de Médecine de Paris.* pp. 83. With 3 plates. 1921. Paris: Imprimerie Jehlen. [Price not stated.]

This is a formulated, comprehensive and critical study of Giardia (Lamblia) in all its relations, and is particularly distinguished by its experimental contribution to the evidence *for* the pathogenic character of the organism. This evidence, which is recorded in very complete detail, may be summarized as follows :—

Four cats—carefully determined to be normal as to their alimentary tract and gastric-juice—were fed, two on cysts of *G. muris*, and two on cysts of *G. intestinalis* (which the author considers to be "homologous"); in every case a severe dysentery followed, which in three instances was fatal on the tenth to twelfth day after the infective feed. Observation of the faeces revealed a first appearance of cysts on the third or fourth day; a first appearance of free flagellates on the fourth day or later; and first evidences of intestinal derangement on the third to fifth day. In the fatal cases more or less extensive bloody effusions and erosions were found, along with free forms of the parasite, in the small intestine to and beyond the caecum; in one case the ulcerations were particularly deep and extensive, and free forms were found abounding through the entire intestinal tract.

Two cats received intra-rectal injections of free forms of *G. muris*: one died on the fifteenth day, and the other was still under observation on the sixth day; the evidences of infection and intestinal disorder appeared on the fourth to fifth day.

Out of five mice—all free from *G. muris*—fed with cysts of *G. intestinalis*, four became infected and died with intestinal inflammation; and one was refractory. But five mice, all naturally infected with *G. muris*, showed no reaction when fed on cysts of *G. intestinalis*.

Of five "negative" mice infected with cysts of *G. muris* after passage through a cat, four were gravely or mortally infected, and one was tolerant.

Five "positive" mice reinfected with *G. muris* gave no reaction.

Among other matters of interest, the blue cysts of *Giardia* infection are discussed; there appears to be some relation between them and the active multiplication of free forms, and it is suggested that they may be empty cysts which have germinated in the intestine.

A. A.

REVERDIN (Hebert) & CHOMÉ (Emile). *Lamblia intestinalis.*—*Rev. Méd. de la Suisse Romande.* 1922. Feb. Vol. 42. No. 2. pp. 118–119.

A case of chronic diarrhoea said to be due to the presence of "a rare parasite"—*Lamblia intestinalis.*

The patient was a robust man of 57 years, who from the age of 22 had been subject to chronic gout. In the Colonies, 27 years before, he had been attacked with acute dysentery, and had passed seven or eight yellow, foetid, liquid, painless stools daily ever since. Amoeba cysts were searched for, but in vain; all that was found were free and encysted forms of *Giardia intestinalis.*

The case was treated with novarsenobenzol, by an intravenous injection every three days for a term of fifteen days [amount not stated] concomitantly with Khossam, animal charcoal, and bismuth salicylate by mouth. The flagellates disappeared the day after the second injection of novarsenobenzol and have not been seen since; after their disappearance some smaller cysts of a different kind were noticed in the stools for some time, but these, too, subsequently disappeared.

Since the disappearance of the flagellates the patient has increased in weight, and passes not more than three or four stools daily.

A. A.

YAKIMOFF (W. L.), SOLOWZOFF (A. S.) & WASSILEWSKY (W. J.). *Oicomonas granulata* **n. sp., parasite de l'intestin de l'homme.** —*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 546–548.

The flagellate here described was cultivated from the stools of three patients suffering from diarrhoea at Petrograd. One appears to have been a case of simple diarrhoea, which recovered; the other two cases were declared at the post-mortem examination to be, one of them glandular tuberculosis with ascites and ulcerous colitis, the other hepatic cirrhosis with anasarca, ascites and haemorrhagic colitis. The author does not go so far as to say that the new species of Oecomonas was the cause of the intestinal symptoms, but thinks that it was a not indifferent influence in their pathology. Subsequently, the organism was cultivated from the straw of the patients' mattresses. [The possibility of the flagellate being merely adventitious or "coprozoic" is not considered.] A. A.

BROUGHTON-ALCOCK (W.) & THOMSON (J. Gordon). *Embadomonas intestinalis* **(Wenyon and O'Connor), 1917; Description of the Cysts and Free Forms found in a Case in England.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1922. Feb. Vol. 15. No. 4. pp. 8–13. With 46 figs.

The flagellar and encysted forms of *Embadomonas intestinalis* as observed by the authors are here described and figured. The parasites were found in great quantity in the stools of a man, aged 54, who had lived in the Far East for 27 years, had been treated for dysentery there and passed stools in which *Entamoeba histolytica* was found, and had come back to England about two years afterwards in poor health as a case of mucous colitis that had been at first wrongly diagnosed as sprue. The definite history of *E. histolytica* infection in the past renders any conclusion as to the part played by Embadomonas in the present uncertain. A. A.

SANGIORGI (Giuseppe). **Di un flagellato dell' intestino umano** (*Pirobodo intestinalis* **n. sottog. e sp.**). — *Pathologica.* 1922. Feb. 1. Vol. 13. No. 317. pp. 69–71. With 5 figs.

Figures and descriptions of both free and encysted forms of a piriform flagellate found in cases of diarrhoea in Albania and named *Bodo* (*Pirobodo*) *intestinalis*, n. subgen. and sp. A. A.

FRANCHINI (G.). **Sur les flagellés intestinaux du type** *Herpetomonas* **du** *Chamaeleon vulgaris* **et leur culture, et sur les flagellés du type** *Herpetomonas* **de** *Chalcides* (*Gongylus*) *ocellatus* **et** *Tarentola mauritanica.*—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 641–645.

As the three kinds of lizards here specified eat insects (usually flies) and these commonly harbour intestinal flagellates, it is probable that

the flagellates found in the gut of the lizards came originally from insects. Sometimes these flagellates can get from the lizard's gut into the lizard's blood and organs. In a case here described, two young mice fed on slime and scrapings from the cloaca of a chameleon harbouring flagellates, developed a mild general infection. A paper more speculative than critical.

A. A.

PATTON (W. S.). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas.* **No. 7. Some Miscellaneous Notes on Insect Flagellates.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 230 239. With 3 plates.

The failure during many years to detect flagellates in the intestine of any of the bloodsucking species of Musca of Madras, and their recent discovery in *Musca bezzii* in the Nilgiri Hills, is noted. This flagellate (found in the intestine of *Musca bezzii*) is described and figured as a new species -*Herpetomonas craggii* ; its entire life-history appears to be passed in the adult fly.

The occurrence of *Herpetomonas mirabilis* Roubaud in several species of Calliphorines is noted ; some of its stages are crithidiform, or even almost trypaniform. The occurrences of *H. muscae domesticae* Burnett, in numerous species of Muscidea ; of *H. sarcophagae* Prowazek, in many species of Sarcophaga ; and of an unnamed Crithidia and an unnamed Herpetomonas in Sepsid flies are noted.

In the author's experience, the intestinal Herpetomonads of dung- and carrion-feeding flies tend to be specific to a particular host, rather than common to numerous species of hosts.

A. A.

FRANCHINI (G.) **Sur un flagellé de Lygoeide** (*Crithidia oxycareni* **n. sp.**). -*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 113-116. With 1 text fig.

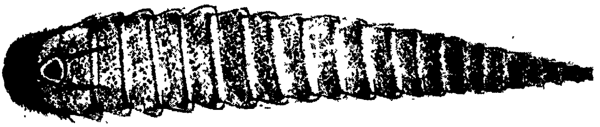
Figures and descriptions of the various forms of *Crithidia oxycareni* and new species of flagellate found in the digestive tube, salivary glands, beak, and also in the faeces, of a small Lygaeid bug, *Oxycarenus lavaterae*, swarming in certain bushes of a Mallow, *Althaea syriaca*. Forms from the digestive tube were inoculated into the peritoneum of a white mouse, and when the mouse —very sick- -was killed 24 days afterwards, scanty free leishmania-forms were found in smears of blood, liver, spleen, and marrow. In two of the plants examined, leishmania-forms were not rare. The plant is probably infected by means of the insect's faeces.

A. A.

KOIDZUMI (Makoto). **Studies on the Intestinal Protozoa found in the Termites of Japan.**--*Parasitology.* 1921. Aug. 31. Vol. 13. No. 3. pp. 235-309. With 6 plates and 5 text figs.

Weird denizens of an obscure world, the flagellate protozoa inhabiting the intestine of the termites that feed on wood are an enigma, a riddle within a puzzle. As the fabled monsters that sprang from the union of Typhon and Echidna, they are unlike anything of their kind, the only other creature at all approaching them being Lophomonas from the gut of the cockroach. Every species of termite has its own specific kinds of flagellates, and all these proper specific kinds of flagellates are commonly found—and in great numbers —in every individual termite of the proper species. At first these termite-flagellates were incontinently styled " parasites," but really they seem to be the exact converse of parasites ; for, although filling their host's gut, they do not rob their host of nutriment, but are said to provide nutriment for the host by converting the inert dry wood swallowed by the host into soluble material—sugar and glycogen, according to BUSCALIONI and COMES—meet for the host's service. Thus, rather than unnecessary and unprofitable endoparasites, they are indispensable paying guests of the guild of archimagirus ; and the association between these two rather mysterious animals appears to be a perfection of symbiosis unparalleled in the strictly animal domain.

From the " medical " standpoint, these flagellates not only present new and illuminating conceptions of " parasitism " in general and of intestinal " parasitism " in particular, but they also suggest clues to arcana of physiology and pathology ; and altogether they are so alluring to the medical man, that no apology is necessary for drawing attention to them—and to this paper which contains, among other things, a guide to the literature relating to them—in a journal of tropical medicine.



Teratonympha mirabilis var. *formosana* Koidzumi, occurring in *Leucotermes flaviceps* in Formosa. Measures 200–250 μ, but sometimes 300 μ or more, in length, and 40–50 μ in width at the widest portion.

[Reproduced by permission from *Parasitology*.]

It may be added that the remarkable ciliate protozoa found in the stomach of sheep and other Ruminants, have also been supposed to play some necessary part in breaking up cellulose as a preliminary to the proper digestive operations of their hosts.

A. A.

i. FRANÇA (Carlos). **Sur deux Phytoflagellés (*L. Elmassiani* Migone et *L. Bordasi* sp. n.).**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 245–254. With 4 figs.

ii. ——. **Encore quelques considérations sur la Flagellose des Euphorbes.**—*Bull. Soc. Path. Exot.* 1922. Mar. 8 Vol. 15. No. 3. pp. 166–168.

iii. FRANCHINI (G.). **Sur un flagellé nouveau du latex de deux Apocynées.**—*Ibid.* Feb. 8. No. 2. pp. 109–113. With 1 text fig.

iv. ——. **Flagellose du chou et des punaises du chou.**—*Ibid.* Mar. 8 No. 3. pp. 163–165. With 1 text fig.

i. The two species of *Leptomonas* here described occur as parasites of S. American Asclepiads. *L. elmassiani* has also been observed in a bug (*Oncopeltus luctuosus*) that lives on the fruit of its plant-host (*Funastrum bonoeriensis*).

The account is prefaced with a criticism of WENYON's classification of this group of Flagellates.

ii. Refers to FRANCHINI's discovery of a trypanosome living in the latex of Euphorbias. Contraverts FRANCHINI's statement that the bug Stenocephalus transmits the flagellosis of Euphorbias because the flagellates of the plant also occur in the bug's intestine and beak. States that the infection is transmitted from the bug to the plant by curious metacyclic forms of the flagellate that occur in the insect's salivary glands. Thinks that analogous metacyclic forms of *Leishmania donovani* will be discovered by Mrs. ADIE in the bed-bug.

iii. *Herpetomonas funtumiae*, parasitic in the Apocynaceous plant *Funtumia elastica*, is here described and figured in its varied forms. It was found free in the latex, and sometimes also enclosed in a sort of "cell," in one of four plants of that species at the Florence School of Agriculture. In a specimen also of *Thevetia nereifolia*—another Dogbane—growing near the parasitized Funtumia scanty non-flagellar forms of the parasite were found. References are given to previous discoveries of Flagellates in Asclepiads and Dogbanes.

iv. The author has found, at Bologna, cabbages infested with Pentatomid bugs (*P. ornatum* and its variety *pectorale*, *P. oleraceum*, and *Aelia acuminata*) which were infected as to the gut and faeces and to a slight extent also the salivary glands and beak, with a Crithidia and a Herpetomonas. The cabbages also were to a slight extent infected. Leaves on which the bugs were abundant withered and died.

A. A.

i. YAKIMOFF (W. L.), WASSILEWSKY (W. J.), KORNILOFF (M. T.) & ZWIETKOFF (N. A.). **Flagellés de l'intestin des animaux de laboratoire.** —*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 558–564. With 1 fig.

ii. FAUST (E. C.). **A Study of Trichomonas of the Guinea-Pig from Peking.** —*Arch. f. Protistenk.* 1921. Vol. 44. No. 1. pp. 115–118. With 1 plate and 1 text fig.

iii. ——. **The Human Trichomonas in North China.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 410–418. With 1 plate.

iv. YAKIMOFF (W. L.) & SOLOWZOFF (A. S.). **Le** *Chilomastix mesnili* **Wenyon en Russie.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 556–557.

v. FRANCHINI (G.). **Au sujet de la culture de l'** *Herpetomonas* **du** *Pyrrhocoris apterus.*—*Ibid.* 1922. Mar. 8. Vol. 15. No. 3. pp. 161–163. With 1 text fig.

vi. SIMON (Charles E.). *Giardia enterica* : **A Parasitic Intestinal Flagellate of Man.**—*Amer. Jl. Hyg.* Baltimore. 1921. July. Vol. 1. No. 4. pp. 440–491. With 2 text figs., 12 charts and 3 plates.

vii. YAKIMOFF (W. L.) & SOLOWZOFF (A. S.). *Monas* **sp. dans les selles de l'homme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. p. 557.

viii. LAVIER (G.). **Flagellés parasites intestinaux du campagnol indigène** *Microtus arvalis* **Pallas.**—*Ibid.* Dec. 14. No. 10. pp. 710–717. With 5 text figs.

i. Descriptions of flagellates from the intestinal contents of white mice, guinea-pigs and rabbits. *Sphaeromonas rossica* from the guinea-pig and *Piromonas rossica* from the rabbit are proposed as n. spp.

ii. *Trichomonas flagelliphora* from the guinea-pig is described and figured as a n. sp., and is compared with *T. caviae* (Davaine) from the same animal. Thousands of specimens were to be seen in every coverglass preparation.

iii. The Trichomonas of this paper is named, without prejudice, *T. hominis*. Nothing new is disclosed

iv. Note of four cases of diarrhoea, in Petrograd, with *Chilomastix mesnili* in the stools.

v. Describes the culture of this Herpetomonas on rabbit's blood-bouillon (six drops of blood to 6 cc. bouillon) at 24° C.

vi. The chief features of this paper are the biometric tables and curves, and some reproductions of figures of earlier authors from LAMBL to WENYON and O'CONNOR.

vii. Note of the finding of a Monas in the stools of a patient having diarrhoea.

viii. Of three flagellates of the field-vole here noticed and figured—Giardia, *Octomitus muris* and *Trichomonas muris*—the first is extremely like *Giardia intestinalis*, though the author hesitates to identify it with that species.

A. A.

BROUGHTON-ALCOCK (W.) & THOMSON (J. Gordon). *Eimeria oxyspora*, **Dobell, 1919, found in a Specimen of Human Faeces in England.** —*Proc. Roy. Soc Med.* (Sect. Trop. Dis. & Parasit.). 1922. Feb. Vol. 15. No. 4. pp. 1–7. With 6 figs.

Oocysts of *Eimeria oxyspora* observed by the authors are here described and are figured in all stages of development.

The patient in whose faeces they were found is a Londoner, aged 30, who has always lived in England, except for short holiday visits to the Continent and a two months' stay in Malta last year. He came up for treatment for digestive disturbance, debility and constipation; there had not been diarrhoea. His diet for some days before the finding of the oocysts had not contained meat or any obvious form of fat. In the faeces, besides the specific oocysts, *E. coli* cysts and eggs of *Trichocephalus dispar* were found and many particles of fat, but not blood or mucus or any pathological exudate or culturable organism.

The specific oocysts were found in all stages of development from early forms containing a single mass of granular protoplasm to fully ripe forms containing four sporocysts, each with two sporozoites. In diameter the oocysts ranged from 33·6μ to 50·6μ, and mainly from this variation in size the authors suggest that DOBELL's *E. snijdersi* may be a variety of *E. oxyspora*.

A. A.

i. CAUCHEMEZ (L.). **Fréquence de la Coccidie du porc** (*Eimeria Brumpti*, **n. sp.**), **en France.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 645–648. With 1 text fig.

ii. ——. **Au sujet du nom spécifique à donner a la Coccidie du porc.** —*Ibid.* 1922. Mar. 8. Vol. 15. No. 3. pp. 160–161.

i. Veterinary writings contain but few references to coccidiosis of the pig, and some of these are but perfunctory. The author has lately made a rather extensive study of pig faeces and has frequently found oocysts of an Eimeria in them. He has studied these oocysts and followed their maturation outside the host, and he has infected sucking pigs by feeding them with the ripe cysts. Investigation of the viscera of infected pigs does not reveal any macroscopic lesion, and pigs passing oocysts in abundance are in perfect health.

The oocysts differ from those occurring in man, in the rabbit, and in cattle, and are here described and figured as those of a new species, *Eimeria brumpti*.

ii. The author has discovered that *Eimeria brumpti* has been described (Feb. 1921) by NÖLLER as *E. suis*, and by DOUWES (Jan. 1921) as *E. Debliecki*. This last name, therefore, has priority.

A. A.

SERGENT (Etienne & Edmond). **Etude expérimentale du paludisme des oiseaux. Un même lot de moustiques peut infecter successivement 3 sujets.**—*C.R. Soc. Biol.* 1922. Feb. 18. Vol. 86. No. 7. pp. 349–350.

In a first series of experiments :—

A canary was bitten by nine Culex infected with *Plasmodium relictum* a month before ; result, a heavy infection.

A second canary was bitten, 15 days afterwards, by three of the Culex that had bitten the first canary : result, a feeble infection difficult to detect.

A third canary was bitten by one of the Culex that had bitten the second canary a month before and also the first canary a month and 15 days before : result, no infection.

In a second series of experiments :—

A canary was bitten by three Culex infected with *P. relictum* a month and a half before : result, strong infection.

A second canary was bitten, 10 days afterwards, by the same three Culex : result, slight infection.

A third canary was bitten by one of the Culex that had bitten the second canary 10 days before and the first canary 20 days before : result, a slight infection ending, however, in a fatal pernicious access.

A. A.

FRANCHINI (G.). *Haemoproteus Chelidonis* **chez l'hirondelle** *Chelidon urbica* **Linn. Stades probables de développement chez la puce** *Ceratophyllus hirundinis.*—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 13–18. With 3 text figs.

The author describes and figures the endoglobular and free forms of a parasite of the genus *Haemoproteus* found in the common swallow in Italy. The forms found by him in the blood include endoglobular young forms and full-grown crescents, exflagellating microgametocytes, microgametes and ovoid and globular macrogametes, and ookinetes ; the forms found by him in the lung include ookinetes, sporoblasts, and free sporozoites.

In the nests of the swallow the flea, *Ceratophyllus hirundinis*, is abundant, and in the mash of the flea the author has found rounded and crescentic forms similar to some found in the swallow, and cysts of different sizes full of small, round or oval, nucleate or non-nucleate, parasites amid vacuoles and masses of pigment.

The author describes and figures what he has seen, and is [as one would suppose] doubtful and uncertain in his inferences. He is not quite sure but that what he has seen in the flea are developmental stages of a gregarine proper to the insect.

A. A.

KUDO (R.). **Studies on Microsporidia Parasitic in Mosquitoes. II. On the Effect of the Parasites upon the Host Body.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 70–77. With 1 text fig.

A useful paper, with a list of species and some references of historic interest. A new Microsporidian, *Thelohania opacita* parasitic in the larva of *Culex apicalis* is described. A. A.

MACARTHUR (W. P.). **A Holotrichous Ciliate Pathogenic to** *Theobaldia annulata* **Schrank.**—*Jl. Roy. Army Med. Corps* 1922. Feb. Vol. 38. No. 2. pp. 83–92. With 5 text figs.

The Holotrichous Ciliate, allied to Cyclidium and Pleuronema, here described and figured, was found swarming in the body-cavity of 22 out of 87 larvae and pupae of *Theobaldia annulata* caught near Blackpool in the month of October. Of the infected insects two were alive when their infection was observed, and died subsequently ; the other 20 were already dead. As many as 1,000 ciliates might be found in an individual larva, but none could be found in the water from which the larvae were taken. A constant feature of the infection was destruction of the host's eyes, and in one instance the ciliates were watched attacking these organs.

The ciliates vary considerably in size and shape, and three forms are figured, namely (1) small forms with a long " tail," a long cytostome, and long peristomial cilia ; (2) larger, intermediate, forms with a short " tail," a shorter cytostome, and shorter peristomial cilia ; and (3) still larger forms without " tail," and with a shorter and more antero-lateral cytostome and periostomial cilia of no extraordinary development. The three stages of this species, as WENYON and the author remark, seem to link the genera *Uronema, Cyclidium, Pleuronema,* and *Glaucoma,* and to suggest that all four might possibly be included in a single generic concept. A. A.

YAKIMOFF (W. L.). **Sur la question de l'** *Uronema caudatum* **Martini.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 555–556.

The author has found *Uronema caudatum* four times—in Petrograd—variously associated with other protozoa, and is, therefore, unable to give any opinion on the possibility of its specific pathogenicity. [On " Uronema caudatum," see DOBELL and O'CONNOR, " The Intestinal Protozoa of Man," p. 116, where it is conjectured to belong to a genus (Cyclidium), species of which are common in water and infusions of all sorts all the world over.]

A. A.

i. ITURBE (Juan). **Sobre algunos datos de Protozologia y Parasitologia, recogidos en San Juan de los Morros.**—*Contribución del Laboratorio Iturbe en el 3er Congreso Venezolano de Med.* 1921. pp. 3–8. With 1 plate. Also : *Gac. Med. de Caracas.* 1921. Sept. 30. Vol. 28. No. 18. pp. 275–277. [With GONZALEZ (E.).]

ii. YAKIMOFF (W. L.). **L'examen des eaux courantes à Pétrograd.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 12–13.

iii. ——. **Les protozoaires et les infections de l'intestin en Transcaucasie.** —*Ibid.* 1921. Dec. 14. Vol. 14. No. 10. pp. 649–652.

——. **Les protozoaires des animaux domestiques en Transcaucasie.**—*Ibid.* p. 652.

iv. LAVIER (Georges). **Hémogrégarines,** *Grahamella,* **Spirochète et Trypanosome du campagnol indigène** *Microtus arvalis* **Pallas.**—*Ibid.* Nov. 9. No. 9. pp. 569–576. With 5 text figs.

i. In these notes are described and figured (1) *Plasmodium gonzalezi,* **n.** sp., in the blood of the Iguanid lizard, *Anolis biporcatus* ; (2) *Cercaria* *guariquensis*, n. sp., parasitic in *Melania venezuelensis*. Record is also made of the occurrence of a microsporidian parasite, probably *Thelohania legeri*, in the larva of *Aëdes pipiens*, and of trematode larvae encysted in the muscles of certain fishes.

ii. The author here notes the occurrence of *Prowazekia Ninae Kohl-Yakimoff* and *Uronema caudatum* in the waters of the Neva, and from it he draws an inference very different from that which would be suggested to readers of the latest information on the subject of the pathogenesis of the intestinal flagellata.

iii. Statistics of laboratory examinations of faeces in Transcaucasia. "*Vahlkampfia Ninae Kohl-Yakimoff*" is mentioned as a new species.

iv. Of the four blood parasites of the vole here described, two, *Grahamella microti* and *Trypanosoma microti*, are new spp.

A. A.

RILEY (William A.). **Some Little Emphasized Guide-Posts to Medical Entomology.**—Reprinted from *Annals Entom. Soc. of America.* 1921. Sept. Vol. 14. No. 3. pp. 159–168.

This interesting essay is based upon the old, old theme, that with all of us in all things and at all times—even with those few who make their way into new domains, or soar above the beaten tracks of thought—a mighty host of intelligent predecessors is still working, even though most of them may be forgotten. The author's object is to remind us that the wonderful discovery of the connexion between mosquitoes and malaria, and other discoveries that followed hard upon it along the same line, all rest upon the labours of a long train of worthy pioneers, starting in the seventeenth century with LISTER and SWAMMERDAM, and their respective discoveries that a Gordiid worm passed some part of its life in an insect, and that the things in after time known as rediae lived in a pond-snail and produced the tadpole-like objects known to later times as cercariae. The author mentions many other names and facts of great historic moment, for which he deserves our thanks; for the constant remembrance of our immense debt to our great predecessors can never make us insensible of our obligations to our great original contemporary minds. The author does well also in exposing from the historic standpoint the pitiful ignorance of the robustious fellows who scorn the science that has not an obvious utilitarian trend, and the pitiful oblivion of the worker who thinks to encase his subject and entomb himself in his own independent tabernacle.

A. A.

WELLS (R. W.), BISHOPP (F. C.) & LAAKE (E. W.). **Derris as a Promising Insecticide.**—*Jl. Econom. Entom.* 1922. Feb. Vol. 15. No. 1. pp. 90–96.

Powdered derris-root is here said to be destructive to Mallophaga on fowls and cattle, though not so good as sodium fluoride; very effective against Anoplura on cattle and dogs; and very remarkably destructive to fleas on dogs and cats. It is sufficiently effective against lice and fleas when diluted with an excipient.

A. A.

CLELAND (J. Burton). **Insects and Their Relationship to Injury and Disease in Man in Australia—No. II.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 258–265.

This paper contains the following among other addenda to an original paper of the same title read by the author at the Australasian Medical Congress of 1911 held in Sydney :—

Of *Earwigs.*—The wound inflicted by the W. African *Dacnodes wellmani* (as is well known) draws blood, and may become severe, probably through septic infection : that of the Australian *Anisolabis colossea* is said to have similar effects.

Of *Ants.*—The bite of "bulldog" ants (*Myrmecia* spp.) gives much pain, and may cause numbness, swelling, and lymphangitis, and even shivers and vomiting ; a man bitten simultaneously by many died from formic acid poisoning. The bite of the tree-ant (*Oecophylla smaragdina*) is very painful [the ferocity of this species and the severity of its bite are notorious in India].

Of *hairy caterpillars and cocoons.*—The Australian species *Euproctis edwardsi, Ocinara lewinae* and *Teara* sp. are mentioned as causing a severe and sometimes persistent rash.

Of *Diptera.*—Myiasis of ear, due in one case to *Lucilia* maggots, and myiasis of perinaeum in an obstetric case. Numerous records of bites and annoyance from sandflies (probably Culicoides), Simulium, mosquitoes, Tabanidae, and "flies." Reference to CUMPSTON'S "History of Smallpox in Australia," p. 35, for an account of smallpox infection supposed to have been conveyed by flies. Records of flies found in pan-closets are numerous.

Of *Bed-bugs and Lice.*—Reference to the prevalence of bed-bugs in Sydney Hospital during the fifties or sixties of last century. Reference to a case of phthiriasis of eyelids—species about one-third the size of *P. inguinalis.*

A. A.

SINTON (J. A.). **Entomological Notes on Field Service in Waziristan.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 575–585.

Phlebotomus papatasii, P. minutus and its var. *antennatus,* and *P. sergenti* ; and *Anopheles turkhudi, culicifacies, funestus* var. *listoni, rhodesiensis, fuliginosus, rossi, maculipalpis, stephensi, pulcherrimus* and *nursei* have been found by the author in Waziristan.

A. A.

LANGERON (Maurice). **Deuxième mission parasitologique en Tunisie Tamerza (septembre–octobre 1919).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 347–382. With 10 text figs.

The geological features and the noxious elements of the fauna of the three contiguous oases of Tamerza, Mides, and Chebika are here described. Ankylostomiasis and bilharziasis were not discovered and the molluscan fauna appears to be unfavourable to the existence of the latter disease. An isolated house 4 km. distant from Tamerza was found to be a focus of Oriental sore ; but in only two of a dozen geckos captured there was a Leptomonas found by culture, and the search for intestinal flagellates in the bloodsucking arthropods of the vicinity was entirely unsuccessful. These included *Anopheles* *hispaniola* and *culicifacies*, five species of Culicini, *Phlebotomus minutus, fallax, papatasii* and *sergenti, Culicoides langeroni, Cimex lectularius,* and *Argas persicus,* which last does not seem to touch man. The larvae and pupae of Anopheles were observed to be flourishing in a superficial liquid mud, or " bouillie sableuse," formed along a line of seepage.

The author deals at some length with the synonymy of *Anopheles culicifacies, hispaniola* and *multicolor*. *A. culicifacies* can be distinguished from *turkhudi, multicolor* and *hispaniola* by larval characters here described and figured. *A. hispaniola,* besides having its own specific larval characters here described and figured, differs from *turkhudi* in its egg. The larval characters of *Culex laticinctus* and *apicalis* and of *Uranotaenia unguiculata* are also described and figured.

A. A.

BOYD (J. E. M.). **The Botany and Natural History of the Dyke-Land near Sandwich, Kent, as far as they concern Medical Entomology.**—*Jl. Roy. Army Med. Corps.* 1922. Jan. and Feb. Vol. 38. Nos. 1 and 2. pp. 41–47 ; 117–130.

From this admirable paper, which is full of careful observations of a most interesting tract of marshland and also of useful records of laboratory work, only a few items of general significance for the sanitarian can be extracted here. The water fern, *Azolla filiculoides,* can deter Anopheles from breeding only mechanically, by completely covering and concealing the water-surface. Small entomostracous crustacea (Daphnia, Cypris, Cyclops) certainly destroy new-hatched mosquito larvae. Farms often revisited for *Anopheles maculipennis* gradually become impoverished or exhausted. A male " Stegomyia fasciata " was seen paired with a female *Culex pipiens,* though nothing resulted. Out of eggs of *Culex pipiens* kept dry for three and five days, but not longer, a certain number hatched ; and out of some larvae removed from water for three hours, and pupae for five hours, but not longer, one larva pupated and one pupa hatched an imago. Cresol up to 1 in 100,000 parts dilution destroyed mosquito larvae rapidly ; the effects of 1 in 250,000 parts were doubtful. Maggots of the common blowfly are active and good travellers ; they (and pupae) are killed by 15 minutes exposure to a temperature of 57° C. The adult flea (*Ceratophyllus garii*) may lie quiescent in the cocoon apparently awaiting a favourable opportunity for emergence. An individual louse may bring forth 295 eggs ; if well fed it may produce 10 in a day. A male louse may live 32 days, a female 46 days. Though louse eggs usually hatch in 7–10 days, the hatching of eggs in unused clothing or bedding may be delayed for five weeks ; but new-hatched larvae die if they do not get a feed within 24 hours. Lice and their eggs are killed by exposure to a temperature of 60° C. for 15 minutes, or of 55° C. for 30 minutes.

A. A.

MACGREGOR (Malcolm E.). **The Influence of Drought upon Mosquito Life in Surrey.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 205–209.

Careful observations of the effects of the long summer drought of 1921 in reducing the numbers of most kinds of mosquitoes in certain parts of Surrey at least. The local species least affected were *Anopheles maculipennis*, which breeds in ponds of considerable persistence, and *Culex pipiens*, which is perhaps of all species the least dependent on natural waters. A. A.

JAMES (S. P.). **Mosquito Life in Surrey during 1921.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Pt. 4. pp. 427–428.

The gist of this paper is that an abnormally dry summer, such as that of 1921, is not likely to lead to a permanent decrease in the mosquito population in tracts where there are waters of considerable permanence. A. A.

EDWARDS (F. W.). **A Revision of the Mosquitos of the Palaearctic Region.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 263–351. With 18 text figs.

The Palaearctic species of Culicidae admitted to this catalogue are 94 in number, and include a quota of 19 Anopheles, 20 Culex and 38 Aëdes. Only two tribes of Culicinae are here recognized, namely, Culicini (including the Culex, Sabethes, and Megarhinus alliances) and Anophelini. Two new, and perhaps disputable, species of Anopheles are introduced, namely, *A. elutus* from Western Asia and Macedonia, and *A. punctibasis* from Japan.

A. elutus, in its larval stage, is "apparently identical" with and, in its adult stage, is not very clearly distinguishable from *A. maculipennis*, but the egg has not any conspicuous lateral floats.

A. punctibasis in its specifications seems not to have any definite point of distinction from *A. sinensis* (here called *hyrcanus*). A. A.

MARTINI (E.). **Zur Bionomie unserer Stechmücken.** [Bionomy of Mosquitoes in Germany.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 11. pp. 341–347.

This paper contains a lot of laboratory notes on the development of *Anopheles maculipennis* and *bifurcatus* and *Theobaldia annulata* at different temperatures under laboratory conditions; also on the effect of prolonged cold on the eggs of *A. maculipennis*. They confirm what is well known, namely, that the hatching of the egg and the development of the larva (food being sufficient) is hastened by warmth and retarded by cold. It is noted that under all the temperature conditions tested the duration of the fourth larval stage was much longer than that of any of the preceding stages. This is a well known experience of most who have bred *Anopheles maculipennis* and *bifurcatus* in the insect-house, and may perhaps be—as MACGREGOR has suggested—merely a phenomenon of the laboratory, due to a slightly unnatural reaction of the water.

It is noted in detail that eggs of *A. maculipennis* kept in an ice-chest on damp earth for different terms—in one instance 10 days—hatched a few days after restoration to water at summer temperature; also that eggs of the same species kept in the ice-chest on damp earth for 10 days and then placed in cold water, hatched two days afterwards. Eggs hatched even when the earth on which they lay had been frozen.

It is also noted that some eggs of *A. bifurcatus* hatched after being kept on damp earth for 12 days.

A. A.

ECKSTEIN (Fritz). **Beiträge zur Kenntnis der Stechmückenparasiten.** [Parasites of Mosquitoes.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 128–135. With 1 plate and 4 figs.

Everyone who examines larvae and adults of mosquitoes occasionally finds parasites in them. The author of this paper mentions several species in which he has observed encysted Trematode parasites, and he figures a larva of *Culex pipiens* with several encysted cercariae, as well as some stages of *Distoma ellipticum* (*variegatum*) from the lungs of the fire-bellied toad.

A. A.

DAVEY (J. B.) & NEWSTEAD (R.). **Mosquitoes and Other Blood-Sucking Arthropods of the Upper Shiri River, Nyasaland.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 457–462.

A list of mosquitoes, moth midges, gadflies, tick-flies, bugs, and ticks caught in a small area on the banks of the Shire river.

A. A.

EVANS (A. M.). **Notes on Culicidae collected in Venezuela.**—*Ann Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4 pp. 445–454. With 2 plates and 3 text figs.

A list of 16 well known species of Culicidae collected in Venezuela, with a comparison of the larvae and of the male hypopygium of *Anopheles argyrotarsis* and *albimanus*.

A. A.

LAMBORN (W. A.). **The Mosquitos of Some Ports of China and Japan.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Pt. 4. pp. 401–409.

This is a continuation report of the Mosquito Survey of Eastern Ports commenced by Dr. A. T. STANTON (see this *Bulletin*, Vol. 16, p. 105) with the main object of defining the position of *Stegomyia fasciata*.

The ports here dealt with are Fuchow, Shanghai, Nagasaki, Kobe, and Yokohama. *Stegomyia fasciata* was not discovered in any of these ports. In all five of them *Stegomyia albopicta* Skuse (=*scutellaris*, Theob.) and *Anopheles sinensis* (here called " hyrcanus ") were found, and *Culex fatigans* Wied. and *C. tritaeniorhynchus* Giles in all except Yokohama.

A. A.

BLACKLOCK (B.). **Notes on an Apparatus for the Individual Breeding of Mosquitoes.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 473–477. With 5 text figs.

Each individual larva is housed in a glass thimble; the thimbles are sunk, up to the lip, each in a pocket dug in a slab of wood, and over the mouth of each thimble is set a short cylinder of glass, covered at top with netting, to receive the imago when it emerges. About 30 different species of larvae can thus be cared for in individual isolation on a slab of wood about a foot long and about 4½ in. broad.

A. A.

MACGREGOR (Malcolm E.). **The Influence of the Hydrogen-Ion Concentration in the Development of Mosquito Larvae. (Preliminary Contribution.)**—*Parasitology.* 1921. Nov. Vol. 13. No. 4. pp. 348–351.

It is a common experience that many mosquito larvae do not thrive when kept in the laboratory; that they remain stunted, perhaps for months, and do not undergo any further transformation.

In breeding the British tree-hole mosquitoes the author found that everything went well if they were kept in their native water, but that if water from tap, or even from pond, were added, something went wrong with them. Experiment revealed the fact that the added waters were alkaline, and that these tree-hole species could flourish only in water of a certain degree of acidity. This acidity seems to be maintained in nature by supplies of *fresh* dry leaves, etc.

In breeding *Anopheles maculipennis* and *bifurcatus* and *Ochlerotatus nemorosus*, which normally live in water of alkaline reaction, the author found, by experiment with the first-named species, that acidulation of the water was fatal—an effect which he attributes in considerable measure to the action of the parasitic fungus, *Saprolegnia*, which normally attacks aquatic insects and flourishes in an acid medium.

With commendable caution the author points out that these experiments of his, which show that an alkaline medium is unfavourable to the brood of tree-hole mosquitoes, and an acid medium unfavourable to the mosquito brood of ponds, may have a limited practical application. Undoubtedly these ingenious experiments support the proposition that in the control of any noxious animal an exhaustive study of the biological conditions is the essential preliminary.

A. A.

ROUBAUD (E.). **La différenciation des races zootropiques d'Anophèles et la régression spontanée du paludisme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 577–595. With 3 figs.

The author has already [see this *Bulletin*, Vol. 16, p. 103] enunciated and constructed an argument for his proposition that in long-settled parts of Europe the concurrence of a copious Anopheline fauna with exemption from malaria (anophelisme sans paludisme) is mainly due to the female *Anopheles maculipennis* having, under propitious circumstances, completely diverted her attacks from man to cattle, and he now seeks to add precision to his argument by evidence that the insect's change of host has been accompanied by a change in the expanse of the maxilla and in the number of the maxillary denticles.

He is satisfied that he has found evidence that in places where man is the principal or the sole host, the maxillae are somewhat slenderer, and their denticles somewhat less numerous, than in places where cattle are the principal hosts but are limited in number or accessibility; and, further, that where cattle are so abundant, and so convenient of access as to be the *sole* hosts, the maxillae and their denticles are intermediate in character between the other two predicables.

The evidence offered by the author is as follows:—

1. He has examined 7 *Anopheles maculipennis* from Algeria, 8 from a locality in Corsica, and 17 from different localities in Macedonia—in all, 32 individuals from highly malarious places where the insect is said to be constant in its attention to man and to have little or nothing to do with cattle. In these insects the average number of maxillary denticles is, for the respective localities, 13, 13·6 and 14.

To emphasize the proffered evidence, the number of denticles is not more than 14 (though in 37·5 per cent. of the 8 from Corsica, and 35·5 per cent. of the 17 from Macedonia, it was "more than 14") in places where the Anopheles are man-eaters.

2. He has examined 25 *A. maculipennis* from Argonne, 25 from La Vendée, and 25 from Holland—in all, 75 individuals from more or less malarious localities where the insect is said to be distinctly addicted to cattle, though its opportunities for indulging its preference are limited or restricted. In these insects the average number of maxillary denticles is, for the respective localities, 15·5, 15·6 and 16·9. To emphasize the proffered evidence, the number of denticles is more than 15 (though in 20 per cent. of the 25 from Argonne, and in 15 per cent. of those from La Vendée, it was not "more than 14") in places where the Anopheles are potential cattle-eaters, and man-eaters only by recourse.

3. He has examined 20 *A. maculipennis* from the neighbourhood of Paris, and 25 from a locality in Savoy—in all, 45 individuals from non-malarious places where the insect is said to be quite constant in its attention to cattle, and quite indifferent or even averse to man. In these insects the average number of maxillary denticles is, for the respective localities, 14·6 and 14·9 (though in 50 per cent. of the 20 from Paris, and 44 per cent. of the 25 from Savoy, it was not "more than 14.").

In these insufficient observations the author sees the very definite action of natural selection upon a single organ of the female *Anopheles maculipennis*. His interpretation of the fact seems to be :—(1) That where the insect has no important host other than the comparatively soft-skinned animal, man, the maxillary armature is not specially affected by natural selection ; but that (2) where the insect, being abundant, has opportunity, but only a limited or a restricted opportunity, for feeding on cattle, those individuals having the most numerous maxillary denticles (and thus being the best qualified for piercing a thick skin and getting a fill of blood quickly) will be *naturally selected* in the competition for the more desirable though thicker-skinned host ; and (3) that where the insect has unlimited opportunity and convenience for feeding on cattle, the maxillae, having attained a requisite standard of perfection, will not, in the absence of any competition for the desirable host, be further specially affected by natural selection.

In other words, the maxillae in the first case will be slenderer and less strongly serrated, in the second case will be particularly strongly serrated, and in the third case will be of an intermediate character.

The conclusion of the author's argument is that places where the formula for the maxillary denticles carried by *A. maculipennis* is less than 14 are places dangerous to man ; that places where the formula is more than 15 are equally dangerous to man, because there the adaptation to cattle is imperfect ; and that places where the formula is more than 14, but less than 15, are the safe localities of "anophelisme sans paludisme."

The author is so well assured of the adequacy of his slight and insecure foundation of anatomical fact to sustain the imposing weight of his conclusions, that he is not afraid to consider the practical application of those conclusions to the control of malaria. While the medical man is busy with the spleen and the blood of the human population, the entomologist will be investigating the denticular formula of the Anopheles. If the denticular formula be above 15 or below 14, the entomologist will know what steps to take, provided he can increase or manipulate the cattle. There may even be exquisite cases where he can test the efficacy of the old remedy of "a hair of the dog that bit him"; for, as the author points out, there may possibly be circumstances where the cattle-tropism of a local breed of Anopheles may be accelerated by the refined method of introducing a breed of cattle-fast Anopheles from outside.

The author's biological argument has a rather too pronounced teleological savour to be taken very seriously.

A. A.

LANGERON (M.). **Sur l'Anophélisme et le paludisme en France.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 30–36.

In this criticism of ROUBAUD's "zootropic" theory, the following among other objections are urged :—(1) That *Anopheles maculipennis* is found in houses, and does bite man, in villages where cattle are plentiful and are lodged in low, dark, ill-ventilated sheds; (2) that the insects may be attracted to cattle-sheds by their darkness and moisture, and not necessarily to feed on cattle; that a remarkable reduction of malaria has occurred in Les Dombes within 35 years—a term too short for a general adaptive evolution of the insect's mouth-parts.

The author agrees with those who attribute the disappearance, or regression, of endemic malaria in France to the systematic use of quinine and the continued improvement in drainage of the soil, road construction, housing, dietary and general conditions of life. One need not deny that cattle may afford some very limited protection by attracting Anopheles away from man, but that small amount of protection is unfortunately balanced by favouring the increase of the insect.

A. A.

SERGENT (Edm. & Et.), PARROT (L.) & FOLEY (H.). **L'armature maxillaire des** *Anopheles maculipennis* **en pays paludéen.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 29–30. With 1 fig.

These authors cannot find any confirmation of ROUBAUD's "zootropic" theory in Algeria. They have examined 1,222 females of *Anopheles maculipennis* from the notoriously malarious plain of Bône, and find that the number of maxillary denticles ranges from 11 to 19, that the percentage of individuals having more than 14 denticles is 46·4, and that the mean general denticular formula is 14·4.

A. A

ROUBAUD (E.). **A propos des races zoophiles d'anophèles.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 36–39.

Roubaud here attempts to defend his theory, of naturally-selected cattle-eating Anopheles harmless to man, from the criticism of his French colleagues.

In answer to the objections from Algiers he says that his maxillary denticular indices were provisional and were intended merely to give a precise outline to his thoughts; and that, after all, the difference between the figures from Algiers and his own is not very great—only 14·4 against 14 as the denticular index of man-eating Anopheles. Then, again, the method of counting the denticles must be scrutinized.

The reply to LANGERON is an even more remarkable example of special pleading. To the objection that *Anopheles maculipennis* does actually get into houses and bite man in certain places where attractive shelters for cattle exist, the reply appears to be that only a few get into the houses whereas thousands go into the cattle-sheds. To the other objections Roubaud replies, without any obvious relevance to the theory, that the intensity of malarial infection is by no means proportional to the relative abundance of Anopheles; that malaria has not reappeared in districts of France where intensive quininization is no longer practised, although Anopheles are always abundant there; and that the cattle-raising parts of France are not particularly unhealthy, although plenty of Anopheles exist in them. He admits that the manifold operations of agriculture, quite apart from the correlated increase of stock, have had much to do with the suppression of malaria, but not so much by their hygienic influence as by their effect on the breeding-places of Anopheles. For by systematic drainage the surface waters have been concentrated in permanent ditches, ponds and canals, and this concentration has enabled the Anopheles to select breeding-places in propinquity to hosts and thus to become changed from wild insects to domestic insects. This important modification has helped to confirm the insects in their preference for animal hosts, thus to give play to natural selection. For a "wild" Anopheles, hatched-out in some remote breeding-place, can do nothing when it encounters a host but satisfy its imperious need for mere blood; whereas the domestic Anopheles, having been brought up alongside hosts, is not so blindly impelled by hunger, but chooses what it likes best.

A. A.

GRASSI (B.). [**Nuovo Orizzonte nella lotta anti-malarica (Memoria Preliminare).**]—*Riv. di Biol.* 1921. Aug. 12. Vol 3. No. 4. 45 pp. [Summarized in *Bull. Inst. Pasteur.* 1922. Jan. 15. Vol. 20. No. 1. pp. 34–37.]

This is a summary by ROUBAUD, controversial in tone, of a paper in which Grassi claims to have understood and made known, as long ago as 1901, the protective aspects of domestic animals in malarious districts. ROUBAUD contends that Grassi's explanation of the attraction of cattle sheds for Anopheles was thermotropic and not the specific protective zootropism that his own theory postulates. As Grassi in his paper regards domesticated animals as only one possible means of intervention between men and malaria he probably would not object to the argument of ROUBAUD.

A. A.

BABAULT (G.). **Observations sur l'adaptation zoophile des Anophèles en Savoie.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 564–566.

At Chindrieux, in the neighbourhood of Lake Bourget, in Savoy, the author found many larvae of *Anopheles maculipennis*, and swarms of the adults in cattle-sheds and stables, but in the course of 15 days' search he did not find a single Anopheles in a dwelling-house. Malarial fevers which formerly were common are now unknown. The Anopheline fauna has given up man and accommodated itself to domestic animals, as ROUBAUD discovered to be the case in La Vendèe and in the neighbourhood of Paris.

A. A.

SELLA (Massimo). *Anopheles claviger*: **Observations on its Distribution in Relation to Domestic Animals and its Movements during Hibernation.**—*Internat. Jl. Public Health.* 1921. Nov.–Dec. Vol. 2. No. 6. pp. 605–616. With 4 text figs.

These observations were made in the village of Talayuela, in the province of Caceres in the south-western quarter of Spain. The inhabitants, about 700 in number, live in houses of one storey, made of masonry or of unbaked brick. Domestic animals are numerous, particularly pigs. The prevalent Anopheles is *A. maculipennis* (=*claviger*). Though it does not breed between the end of November and the end of March, it is only partially inactive during the winter, its state being described as "semi-hibernation."

In winter, when the animals are brought in at night—the stables and corrales being among the houses—the Anopheles are found in the stables and are hardly ever seen in the houses.

In spring and summer only the pigs are shut in at night, and then, in June and July, though Anopheles are still abundant in stables at the periphery of the village, they are very numerous in the houses.

The distribution of the insects in January and in June is graphically shown in two sketch plans.

A. A.

LEGENDRE (Jean.) **Anophélisme et cuniculiculture.**—*C.R. Acad. Sci.* 1921. Oct. 10. Vol. 173. No. 15. pp. 600–602.

In the author's experience, at Frejus, in the south of France, "*Anopheles maculipennis* normally feeds on the rabbit, exceptionally on man, the fowl, or the horse, less rarely on the pig and she-goat." Again "it loves to live all the year round in the atmosphere of the rabbit-hutch." Again "this insect deserts the communes from which rabbits are excluded, even if other animals exist there." In concluding that "rabbit-breeding is an effective protection against malaria transmitted by *A. maculipennis* in Europe," the author may or may not be right, but he is overlooking the fact that one of the categorical statements quoted above supplies the major premise of an entirely contradictory conclusion.

A. A.

BAC[H]MANN (A.). **Notes sur les moeurs des anophèles et leur conditions de gîtes dans la ville de Famailla (Tucuman, République Argentine).**—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 506–511. With 3 plates.

The Government of Tucuman, in the Argentine Republic, have established in the country town of Famailla, a station to study for practical ends the life of the local Anopheles. The common local species are *A. pseudopunctipennis* and *A. albitarsis*. The former can be found in houses throughout the town and environs at any hour of the day, both males and new-hatched and gravid females; as many as fifteen may be found in one room, and many more in dark and ill-ventilated dwellings. *A. albitarsis*, though a few males have been found at home in houses, lives abroad and only invades houses in numbers at nightfall.

Both these species breed in floating mats of the water-weed, known in the vernacular as *lama*, which collect in any clear, tranquil or gently moving water that is freely exposed to the sun and has a sandy bottom. Under those conditions the larvae flourish, even if the water be only a centimetre deep. But they are never found in shade, even when all the necessary aquatic conditions are existent.

A. A.

BACHMANN (Alois). **Programa de lucha para llevarse a cabo en Famaillá contra los anófeles y sus larvas.**—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. May–June. Vol. 27. No. 3. pp. 117–137. With 8 figs.

This paper deals with the general principles of mosquito (Anopheles) control in their application to existing conditions at Famailla, the facts and figures of which are identical with those recorded above.

A. A.

GRASSI (B.). [**Osservazioni sulla Vita degli Anofeli.**] [Observations on the Life of Anophelines.]—*Rend. R. Accad. Naz. Lincei, Rome.* Classe Sci. fisiche, matemat. e naturali. 1920. Nov. 21–Dec. 5. Vol. 29. Nos. 10–11. pp. 307–313, 339–344.

From experimental observations made in the summer of 1920 the author concludes that the life of Anophelines at that season is very short. This may help to explain the absence of malaria with the presence of Anophelines as, though the insects may get infected, but few of them may live long enough to become actively infective.

Anophelines have some tendency to return to the place where they have fed, and this tendency should be employed against them in dwellings rather than in pigsties, etc.

A. A.

HERMS (William B.). **Distributional and Ecological Notes on Anopheline Mosquitoes in California.**—*Jl. Econom. Entom* 1921. Oct. Vol. 14. No. 5. pp. 410–414.

This paper is of interest mainly local. In the survey a distance of 18,000 miles was covered by automobile, the levels ranged from about 200 ft. below sea level to 10,000 ft. above it, and 690 collections of mosquitoes of all kinds were made. The obvious, but quite necessary, truths are enunciated that the occurrence of malaria depends on other factors besides the presence of potential Anopheles carriers—temperature, propinquity of population to anopheline foci and abundance of the specific Anopheles being three of them.

A. A.

FREEBORN (Stanley B.). **The Seasonal History of** ***Anopheles occidentalis*** **D. & K. in California.**—*Jl. Econom. Entom.* 1921. Oct. Vol. 14. No. 5. pp. 415–421. With 2 charts in text.

This paper is mainly of local interest, but it impresses the general truth that efficient malaria-mosquito control depends upon a full knowledge of the life-history of the particular species of Anopheles.

A. A.

BONNE-WEPSTER (J.) & BONNE (C.). **Surinaamsche Anopheles-soorten.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 673–679. With 1 plate.

The following species of Anopheles are found in Surinam : *Anopheles argyrotarsis, tarsimaculatus, peryassui, farjardi, apicimaculatus, mediopunctatus, nimbus, hylephilus* and *eiseni*. Keys for the identification of the adults and for such of the larvae as are known are here provided.

A. A.

BARBER (M. A.) & HAYNE (T. B.). **Arsenic as a Larvicide for Anopheline Larvae.**—*Public Health Rep.* 1921. Dec. 9. Vol. 36. No. 49. pp. 3027–3034.

In experiments in the laboratory and in the field the authors found Anopheles larvae to be very sensitive to Paris green. The poison is mixed with 100 times its volume of fine dust and the mixture is distributed by hand, aided by wind. The authors do not apprehend danger to anybody or anything but Anopheles larvae—a very comfortable assumption.

A. A.

MACFIE (J. W. S.). **The Effect of Saline Solutions and Sea Water on** *Stegomyia fasciata*.—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 377–380.

Larvae of *Stegomyia fasciata* have been found by the author [see this *Bulletin*, Vol. 7, p. 189] to be killed in a 2 per cent. salt solution and eggs in a 2·3 per cent. solution and females to be reluctant to lay their eggs in such solutions. In these more recent experiments the author finds that a 1–1·4 per cent. solution of salt, or sea water of equivalent strength, have a sufficiently destructive effect, and he thinks therefore that where it is available sea water might be used for municipal flushing purposes as a device against this dangerous insect.

A. A.

SÉGUY (E.). **L'*****Aedes jugorum*** **Vill. et les larves de moustiques à branchies très développées.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 25–28. With 1 fig.

Several species of divers genera of Culicidae are here mentioned as possessing large tracheal gills. They are larvae that live either in small collections of water that are liable to evaporate quickly or in very foul water.

A. A.

i. MACGREGOR (Malcolm E.). **The Structural Differences in the Ova of** *Anopheles maculipennis, A. bifurcatus* **and** *A. plumbeus.*—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 417–424. With 1 plate.

ii. MARTINI (E.). **Ueber die Eier unserer Anopheles.**—*Cent: f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 362–365. With 4 text figs.

iii. IYENGAR (M. O. Tirunarayana). **A Note on Grappling Tail-Hooks in Anopheline Larvae.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 630–633. With 2 plates.

iv. BLACKLOCK (B.). **Breeding Places of Anopheline Mosquitoes in Freetown, Sierra Leone.**—*Ann. Trop. Med. &Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 463–471. With 5 plates & 3 maps.

v. MARTINI (E.). **Ueber einen Aëdeszwitter.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 363–364.

vi. LUDLOW (C. S.). **A New Philippine Mosquito** (*Diptera, Culicidae*).—*Milit. Surgeon.* 1921. Dec. Vol. 49. No. 6. pp. 690–691.

vii. DUNN (Lawrence H.). **The Lake Mosquito,** *Mansonia titillans*, **Walk., and its Host Plant,** *Pistia stratiotes*, **Linn., in the Canal Zone.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Part 1. pp. 7–20.

viii. PAWAN (J. L.). **On the Eggs and Oviposition of** *Psorophora* (*Janthinosoma*) *posticata*, **Wied. (Culicidae).**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Part 4. p. 481. With 1 plate.

(i) The eggs of these three species are well described and beautifully figured in dorsal, lateral and ventral aspect.

(ii) Comparisons, with good figures, of the eggs of *Anopheles maculipennis, bifurcatus* and *plumbeus.*

(iii) The author in a paper read before the Indian Science Congress, in January 1920 noticed the hooked extremities of the hairs of long terminal hair tufts of Anopheles larvae, and here enlarges on the subject.

(iv) This paper, which includes some very good photographs of Anopheles breeding-places, is of local interest.

(v) Describes an Aedes hermaphrodite.

(vi) *Stegomyia punctifemur* is described, as a new species, from the Philippines.

(vii) A most interesting and complete account of the insect and of the giant Lemnad, *Pistia stratiotes*, of wide circumtropical distribution, from which the larva and pupa of the insect obtain their air.

(viii) A carefully descriptive paper.

A. A.

WATERSTON (James). **A Contribution to the Knowledge of the Bionomics of Sand-Flies.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 69–92. With 1 plate & 7 figs.

The observations here recorded in great detail were made in camp in Macedonia, mainly in August and September, 1918. The species observed were *Phlebotomus papatasii, minutus* and *perniciosus*, of which the first was by far the most abundant (about 95 per cent.), and also the most active and voracious. Eggs and larvae are extremely difficult to find, and, in fact, were searched for without success. The adult flies were found sheltering during the day in and about the tents, in cracks in the earth, and between piled sand-bags.

Very full directions, illustrated by figures, are given for keeping and rearing Phlebotomus. Adults can be kept in earthenware pots standing in water and containing a little water in the bottom. To get females to lay in such pots, a tray of moist earth, slightly impregnated with faeces, should be stood in the water in the bottom of the pot. The eggs must not be allowed to get dry. The larvae also require a moist atmosphere, and for food finely-ground earth that has been impregnated with blood is suitable. Success, in fact, appears to depend on keeping the insect in a moist atmosphere in all its stages, without allowing the environment to get mouldy.

A. A.

FRANÇA (Carlos) & PARROT (L.). **Essai de classification des phlébotomes.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 279–284. With 6 text figs.

In an earlier paper [see this *Bulletin,* Vol. 18, p. 196], the authors proposed to divide the genus *Phlebotomus* into two subgenera. They now propose five subgenera, which are here severally defined, the specific components of each being allocated in tabular form.

A. A.

i. PARROT (L.). **Notes sur les phlébotomes.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 269–278. With 10 text figs.

ii. VIALATTE (Ch.) & PARROT (L.). **Phlébotomes du Maroc.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. p. 566.

iii. NEWSTEAD (R.). **A New Species of** *Phlebotomus* **from Trinidad.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 47–50. With 1 fig.

iv. FRANÇA (Carlos). **Observations sur le genre Phlebotomus.**—*Bull. Soc. Portugaise des Sci. Naturelles.* 1921. Jan. 29. Vol. 9. 18 pp. With 3 text figs.

i. Detailed and tabulated comparisons of *Phlebotomus minutus* and its variety *africanus* with *P. bedfordi* and *P. fallax.* Also draws attention to the distribution of *P. sergenti,* and to abnormalities in the genitalia of the male in certain species of this genus.

ii. Note on the occurrence of four species of Phlebotomus, namely, *papatasii, perniciosus, sergenti* and *minutus* var. *africanus,* in Morocco.

iii. *Phlebotomus trinidadensis* n. sp. is described and figured. A relatively small species; superior claspers with five large spines—three terminal and two slightly beyond the middle, and opposite—and without tufts of non-deciduous hairs proximally. This is the first authentic record of Phlebotomus from Trinidad.

iv. The author describes according to his own formulary, and he also figures, *Phlebotomus vexator,* Coquillet, and *P. argentipes,* Annandale and Brunetti. He also distinguishes *P. brumpti* from *P. vexator* by his own formulae, and suggests that *P. zeylanicus* is a variety of *P. argentipes.*

A. A.

INGRAM (A.) & MACFIE (J. W. S.). **West African Ceratopogoninae.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 313–374. With 1 plate and 23 text figs.

This paper on West African Ceratopogoninae is a continuation of those already noticed in this *Bulletin,* [Vol. 18, p. 199; Vol. 19, p. 114]. It contains definitions of two new genera, descriptions of 20 new species and one new variety, descriptions of five larval and nine pupal forms recently discovered, and descriptions of the recently discovered male and of the recently discovered female of two other species.

A. A.

PATTON (W. S.). **Notes on the Species of the Genus** *Musca*, **Linnaeus—Part I.**—*Bull. Entom. Res.* 1922. Feb. Vol. 12. Part 4. pp. 411–426.

It has been the common and not unnatural belief that *Musca domestica* of Linneus is as ubiquitous as man himself; but the author finds, as regards the males of the Indian house-flies hitherto identified with *Musca domestica,* that they differ from the males of the typical British representatives of the species in having a much narrower front. On this character, therefore, he provisionally separates these questionable Indian representatives as "*Musca domestica,* L. (atypical)," and thus narrows the domain and relieves India of the burden of the supposed ubiquitous typical *Musca domestica.*

But, alas, there are in India, as elsewhere, other species of the genus Musca, which, both in their appearance and in their persistent and objectionable attention to man, resemble *Musca domestica* so closely that none but an expert can choose between them. And again, there are still other species which, though they have a most misleading likeness to *M. domestica* and its congeners aforesaid, have quite different habits of their own; they do not haunt kitchens and shops and annoy man himself, but they trouble his domestic animals, feeding on their secretions and exudations and sores.

Thus, from the practical as from the academic standpoint, it is necessary to recognize apart all these many kinds of flies which, to the careless observer, might from their general similarity pass under the name of *Musca domestica.*

In the present paper this practical need is being satisfied; it is a first instalment of a revision of the genus *Musca* and deals with the Oriental species, 15 in number, and the Australian species which at present appear to be six.

A. A.

ROUBAUD (E.). **Fécondité et longévité de la mouche domestique.**—*C.R. Acad. Sci.* 1921. Nov. 28. Vol. 173. No. 22. pp. 1126–1128.

At a temperature of 20° C., Roubaud has kept flies (*M. domestica*) alive in a small muslin cage for 76 days. With proper nourishment, *which must include nitrogenous matter,* the fly under the above conditions starts its first batch of eggs on the 6th–8th day after its eclosion, and continues with further batches every four days on an average; and there may be 120 eggs in a batch. The largest batches are produced on a diet of condensed milk. Too close confinement is very unfavourable to the house-fly.

Roubaud concludes from his experiments that in warm weather a normal house-fly will give issue to at least 600 eggs in a course of about 40–60 days.

A. A.

BISHOPP (F. C.) & LAAKE (E. W.). **Dispersion of Flies by Flight.**—*Jl. Agric. Res.* Washington. 1921. Aug. 15. Vol. 21. No. 10. pp. 729–766. With 3 figs.

The authors of this long paper on the powers of flight of flies describe in full detail how their experiments were devised and conducted and give a very particular account of their observations. Altogether the number of flies manipulated was, by estimate, about 234,000, belonging to nine species, but mainly *Musca domestica, Chrysomyia macellaria,* and *Phormia regina.*

They found that liberated flies scatter in all directions, that they travel distances much greater than is commonly supposed, and that though their main objects are, of course, either to reach food or a fit place for lodging their eggs, they are not always satisfied with the first favourable place reached. The greatest distance travelled by *Musca domestica* was 13·14 miles; by *Chrysomyia macellaria,* 15·1 miles; and by *Phormia regina,* 10·9 miles. *Musca domestica* and *Chrysomyia macellaria* seem to like to go with the wind, but can go at right angles to it, or against it; moderate winds, however, do not seem to exercise much influence any way.

The distances travelled by other species used in the experiments were: *Lucilia caesar,* 3·5 miles; *L. sericata,* 1·2 miles; *Synthesiomyia brasiliana,* 0·5 mile; Sarcophaga spp., 3 miles; *Ophyra leucostoma,* 7 miles; and *O. aenescens,* 4·1 miles; but the authors are not satisfied that the number of individuals used was large enough for forming valid conclusions as to the powers of dispersion of any of these species.

A. A.

JOHNSTON (T. Harvey). **Notes on Certain Queensland "Bush Flies."** —*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 265–272.

A full descriptive account of *Eumusca vetustissima* Walker, and of *Viviparomusca fergusoni,* and *Musca* (*Promusca*) *terraereginae* and *hilli,* all of JOHNSTON and BANCROFT, with remarks on the trouble they cause to stock and on their possible relation to public health questions. Five species of parasitic Hymenoptera, one of which is known to destroy pupae of these flies, are also mentioned.

A. A.

PATTON (W. S.). **Notes on the Myiasis-producing Diptera of Man and Animals.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 239–261. With 2 plates & 2 text figs.

This is a useful paper containing much systematized information about dipterous maggots that cause different kinds of myiasis in man and other mammals, and two good plates illustrating the specific characters of the posterior stigmata and their air-slits by which these different kinds of maggots can be identified.

The maggots are catalogued in three series, namely:—(1) "Specific Myiasis-producing Diptera," including the *Oestridae* (of which a considerable list of species, with their respective hosts, is given); *Chrysomyia bezziana,* two species of *Cordylobia,* and *Wohlfahrtia magnifica*; (2) "Semispecific Myiasis-producing Diptera," including species of Calliphora, Lucilia, Chrysomyia, Cochliomyia, Pollenia, Phormia, Sarcophaga, Cynomyia and Apiochaeta; and (3) "Accidental Myiasis-producing Flies," including Eristalis, and some Anthomyids and acalyptrate Muscidea.

A. A.

PATTON (W. S.). **Some Notes on Indian Calliphorinae. Part II.** *Lucilia argyricephala*, **Macq.** (*serenissima*, **Fabr.**), **the Common Indian Bazaar Green Bottle, whose Larvae occasionally cause Cutaneous Myiasis in Animals, and** *Lucilia craggii*, **sp. nov., one of the Common Blow Flies of Indian Hill Stations. Part III.** *Chrysomyia megacephala*, **Fabr. (Dux Esch), the Common Indian Blue Bottle, whose Larvae occasionally cause Cutaneous Myiasis in Animals, and** *Chrysomyia nigriceps*, **sp. nov., the Common Blue Bottle of the Nilgiris. Part IV.** *Chrysomyia albiceps*, **Wied.** (*rufifacies*, **Froggatt**), **one of the Australian Sheep Maggot Flies, and** *Chrysomyia villeneuvii*, **sp. nov. Part V.** *Lucilia pulchra*, **Wied.** (*ruficornis*, **Macq.**), **a Larviparous Calliphorine, and** *Lucilia ballardii*, **sp. nov., a Common South Indian Blow Fly.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 648–554. With 1 coloured plate; pp. 555–560. With 1 coloured plate; pp. 561–569. With 2 text figs. & 1 coloured plate; pp. 570–574. With 1 coloured plate.

The species particularized in the title are carefully described in all their stages and in their habits, and are also beautifully figured by Mrs. Patton. The larvae of *Chrysomyia albiceps* and *villeneuvii* are peculiar both in form and in habits ; their abdominal segments are prominently and regularly festooned, every lappet of the festoons being tipped with spines ; and they themselves are predacious on larvae of other Calliphorines, which they hold firmly by fixing them with the spines of the terminal segment and then coiling the body round them.

LARROUSSE (F.). **La myiase oculaire à** *Oestrus ovis* **L. dans la région parisienne.**—*Bull. Soc. Path. Exot.* Nov 9. Vol. 14. No. 9. pp. 595–601. With 5 text figs.

Apropos two cases of ophthalmyiasis due to a first-stage larva of *Oestrus ovis*, the author draws attention to the difference between this and the same stage of the *Rhinoestrus purpureus* larva, and reproduces PORCHINSKY's figures of both species. In the young larva of *Oestrus ovis* the mouth hooks have a fairly open curve, and the terminal segment of the body is crowned with 20–22 spines, whereas in that of *Rhinoestrus purpureus* the mouth hooks are sharply recurved and talon-like and the body terminates in 8 or 10 spines.

Ophthalmyiasis caused by *Oestrus ovis* is, as the brothers SERGENT have stated, common enough in North Africa, but *Rhinoestrus purpureus* is a more generally common cause ; young larvae of Calliphorinae and Sarcophaginae are sometimes responsible, and Hypoderma has been observed, but always as an intra-ocular parasite.

The author gives reference to 16 papers on this subject.

A. A.

GABRIELIDES (A.) & GUIART (J.). **La myose oculaire à** *Oestrus ovis* **à Constantinople.**—*Bull. Acad. Méd.* 1922. Feb. 28. 3rd Ser. Vol. 87. No. 9. pp. 253–255.

Case of ocular myiasis in a shepherd. Under novocaine 14 first-instar larvae of *Oestrus ovis* were extracted.

A. A.

GEDOELST (L.). **Le trimorphisme larvaire des oestridés.**—*C.R. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 501–504.

BOAS has described four larval stages for *Gastrophilus pecorum*, and LAAKE five for *Hypoderma bovis* and *lineatum*: the author's observations lead him to conclude that the larvae of Gastrophilus and Hypoderma have, like all other Cyclorraphous larvae, only three stages.

A. A.

BENGTSON (Ida A.). **Preliminary Note on a Toxin-Producing Anaerobe isolated from the Larvae of** *Lucilia caesar*.—*Public Health Rep.* 1922. Jan. 27. Vol. 37. No. 4. pp. 164–170.

The organism here described as having been isolated from the larvae of *Lucilia caesar* is apparently non-proteolytic in meat-mash media but produces gas abundantly. It is a non-motile rod, 3–6μ, by 0·5–0·8μ, with rounded ends, and occurs singly, but sometimes in pairs or short chains; it is gram-positive in young cultures but rarely so in older cultures; and it forms terminal spores. Toxin was produced in meat cultures of two or three days, or after longer terms of incubation. The filtrate of the organism is toxic both by inoculation and by mouth to ordinary laboratory animals, monkeys, pigeons and chickens, as is the toxin of *Clostridium botulinum*, but botulinus antitoxin confers no protection. The symptoms resemble botulism—inability to stand, prostration and salivation.

Cultural characters in divers media besides meat-mash are recorded.

A. A.

MURRAY (William A.). **Note on Relation between Tsetse Fly** (*Glossina morsitans*) **and Game in the Proclaimed Area, Nyasaland.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 118–121. With 1 map.

The author, who from 1905 was on the look out for cases of sleeping sickness and was personally cognizant of the earliest cases that were actually diagnosed in Nyasaland (in 1908) considers that the disease was introduced about that time from Lake Tanganyika or from N.E. Rhodesia, or from both places. He reviews the progress of the trypanosome infection from West Africa and the Lower Congo to the Congo basin generally (1892) and Uganda (1896), thence, via Lake Tanganyika, towards the Katanga district, and thence to N.E. Rhodesia (1908), on the assumption that in its course the alteration in the specific insect carrier from *palpalis* to *morsitans*, combined with other circumstances not at present understood, effected changes in the nature of the trypanosome which culminated in the establishment of the distinct *rhodesiense* "strain." The author has an impression that both the virulence and the spread of the infection have diminished in Nyasaland.

A. A.

FISKE (W. F.). **Report of Entomologist.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1920.*—pp. 49–64.

This report deals with Victoria Nyanza Infected Area, and consists mainly of direct and indirect argument for the amendment of the Sleeping Sickness Regulations, so as to permit the repopulation of the said area and the rehabilitation of the fisheries which in days before the great epidemic were its most important industry. Much of the report is occupied with observations on the fisheries, and on other, subsidiary, economic enterprises.

The author's line of argument is that the tsetse fly has no predilection for human beings, but is a creature of the jungle, and, like other wild creatures, tends to disappear before the advancing turmoil of industrial man ; and therefore, that the surest way of extirpating the fly in a particular area is to promote and encourage the industries by which the local population thrives and multiplies and finally asserts its mastery of the jungle. The entomologist plays his part by showing how appropriate clearing and cultivation and the maintenance of open pastures, etc., may hasten the discomfiture of the fly by depriving it of shelter and breeding grounds.

The argument is sound enough ; and in insisting on the view that the " control " of the tsetse fly must be one of the incidents of a general economic progress and is therefore on a different plane of experience from the control of insect pests in countries that have left the pioneer stages of civilization far behind, the author has done boldly, since, like the little eyases in Hamlet, he may thereby appear to exclaim against his own succession. The argument, coming from an entomologist, may disappoint a perplexed executive, but it does not shock those who have considered how in England—among other unheeded results of the change in the general standard of industrial and material comfort during the last few generations—the anopheles mosquito has quietly been relegated to a harmless place in its own obscure sphere.

It may be repeated that the author's theory of tsetse fly extermination is sound, though not particularly comforting. But when the author goes on to contend that the persistence of foci of sleeping sickness—or, as he puts it, " the recurrence of a few localized centres of epidemic "—is necessary in order to excite the population against the fly, he carries the argument into academic regions where it is more interesting to the metaphysician than to the sanitarian who prefers goads tempered with humanity.

Among items of interest it is noted that in Sese the situtunga antelope have so increased that in certain localities formerly densely infested by fly they have destroyed the low bush to such an extent as to have caused complete disappearance of fly ; also that goats have proved a wonderfully efficient aid in maintaining new clearings, but that the native breed is not hardy.

A. A.

SCHWETZ (J.). **La présence de pupes de *Glossina palpalis* à 1,500 m. de l'eau.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol 15. No. 1. pp. 23–25.

There are in the Kwango district of Belgian Congo, thickets having an area of 5,000–10,000 square metres and lying some distance from water, which give cover to *Glossina palpalis.* These thickets, which usually mark the sites of old villages, generally harbour pigs. In one of the smallest of these thickets, 1,500 metres away from water and containing only three large trees, a living pupa and also four empty pupal cases of *G. palpalis* were found, in loose dry soil only slightly shaded [*cf.* FISKE ; this *Bulletin,* Vol. 17, p. 119].

A. A.

NEWSTEAD (R.) & EVANS (Alwen M.). **A New Tsetse-Fly from the South Cameroons.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 51–54. With 2 text figs.

This new species from the South Cameroons, *Glossina haningtoni*, is very close to *G. fusca*, but differs in the much shorter "palpi (proboscis)," the slightly more robust appearance and in some details of the genitalia—the harpes of the males having each three teeth, and the "signum" of the female being slightly longer than broad and having the paired crescentic folds almost continuous behind.

A. A.

CRAGG (F. W.). **The Geographical Distribution of the Indian Rat Fleas as a Factor in the Epidemiology of Plague: Preliminary Observations.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 374–398. With 1 map, 3 charts in text and 1 plate.

Although rats occur everywhere in India and all of them may be assumed to have fleas, and although we do not know of any climatic or topographical or artificial conditions unfavourable to the general spread of rat and rat-flea infection all over the country, yet it is a fact that there are certain parts of India to which plague—dealing with the history of the disease since the Bombay outbreak in 1896—has never spread, and certain parts which it has reached occasionally without any consequent epidemic conflagration. The areas which have been notably spared are situated in the southern part of the Madras Presidency and the east coast, in the plateau of Central India, in Eastern Bengal and Assam, and in the western part of Burma. In Madras itself, though the disease has been repeatedly introduced, it has never become epidemic.

As long as it was supposed that all the rat-fleas of the greatly preponderant rat-flea genus *Xenopsylla* were of one species, *X. cheopis*, these remarkable gaps in the dispensation of plague were attributed to some undiscovered factor in which the rat-flea was not necessarily implicated; but now that it is known that the Xenopsyllae of Indian rats include three distinct species—*X. cheopis*, *X. astia* and *X. brasiliensis*—it is rational to suppose, and Major Cragg does suppose, that not all of them—possibly only one of them—may be potent to spread the plague bacillus.

It might be thought that the surest way of settling the matter would be to find out by experiment whether there is any difference between these three species in their behaviour so far as the intake and output of the plague bacillus is concerned. Major Cragg may be trusted to attend to this part of the proposition in due course; but in the meantime he has carried out some stages of the necessary preliminary investigation as to whether in the distribution of each separate species in India there is anything suggestive of such a difference of behaviour.

He here gives us the results of a laborious examination of 107 collections—aggregating 17,339 individual specimens—of rat-fleas representative of areas variously shown on the plague map of 1917 as heavily infected with plague, lightly infected, and free from plague. The whole mass of material has been specifically identified, with the object of discovering what in these diverse areas is the actual percentage of each species of rat-flea present.

Of the 17,339 fleas identified, 53·9 per cent. are *X. cheopis*, 36 per cent. *X. astia*, 7·7 per cent. *X. brasiliensis*, 2·1 per cent. *Ceratophyllus* sp., and 0·3 per cent. *Leptopsylla musculi*; and though the local incidence of each species is shown in the tabulated summaries, attention is concentrated on *X. cheopis* and *X. astia* as being not only the most numerous but also the most generally distributed over the whole country.

The tables themselves must be studied. The author is satisfied that they " point very strongly to a close relation between the predominance of *X. cheopis* and high plague mortality." He expresses the opinion, indeed, that *X. cheopis* is " truly the plague flea," while *X. astia* is the predominant species in areas which have been free from plague or have suffered but lightly. Some such suggestive records can certainly be picked out. Taking, for instance, the " plague-free " places, Akyab, Guntur, Cocanada, and the " plague-free " South Arcot area: of 1,421 Akyab fleas in the collections, 97·8 per cent. were *astia*, and only 2·2 per cent. *cheopis*; of 149 Guntur fleas in the collections, 90·6 per cent. were *astia*, and only 9·4 per cent. *cheopis*; of 264 Cocanada fleas in the collections, 77·3 per cent. were *astia* and 22·7 per cent. *cheopis*; of 224 South Arcot fleas in the collections, all were *astia*. Again, all the 184 fleas sent to the author from Madras, where plague has never been epidemic, were *astia*. On the other hand, these records show a number of places that have suffered something much more than lightly from plague, where *astia* is very well represented. For instance, of 782 fleas from Bombay, 49·9 per cent. were *astia* and 49·6 per cent. *cheopis*; of 328 from Rohtak, where the plague mortality for twenty years, 1896–1917, is shown as 100–150 per 1,000, 20·5 per cent. were *astia* and 79·5 per cent. *cheopis*; of 626 from Lahore, where the plague mortality for the twenty years is shown as 150–200 per 1,000, 17·6 per cent. were *astia* and 79·2 per cent. *cheopis*; of 173 from Chiniot (Jhang), where the plague mortality for the twenty years is shown as 20–50 per 1,000, 56·1 per cent. were *astia* and 36·8 per cent. *cheopis*.

Then, furthermore, although the records certainly show that in seven places, where the plague mortality for the twenty years, 1896–1917, ranged from 150–300 per 1,000, the predominant rat-flea—up to 99 per cent. of the collection in one place—was *cheopis* they also show that in Bombay, where the plague mortality for the twenty years ranged from 150–200 per 1,000, out of the collections of 782 rat-fleas, 49·9 per cent. were *astia* against 49·6 per cent. *cheopis*; that of 328 from Rohtak, where the plague mortality for the twenty years was 100–150 per 1,000, 20·5 per cent. were *astia* against 79·5 per cent. *cheopis*; that of 626 from Lahore (plague mortality 150–200 per 1,000) 17·6 per cent. were *astia* against 79·2 per cent. *cheopis*; that of 1,567 from Gurgaon (plague mortality 50–100 per 1,000) 61·6 per cent. were *astia* and only 37·9 per cent. *cheopis*; that of 181 from Rangoon (plague mortality also 50–100 per 1,000) half were *astia* and half *cheopis*, as in Bombay; that of 173 from Chiniot (plague mortality 20–50 per 1,000) 56·1 per cent. were *astia*, and only 36·8 per cent. *cheopis*; and that of 250 from Multan (plague mortality 5–10 per 1,000) 99·6 per cent. were *astia* and only 0·4 per cent. *cheopis*. In the collections also from Lyallpur, Bangalore and Bellary—all places that had a considerable plague mortality—the percentages of *astia* run high.

A. A.

CHRISTOPHERS (S. R.) & CRAGG (F. W.). **On the So-Called "Penis" of the Bedbug** (*Cimex lectularius*, **L.**) **and on the Homologies Generally of the Male and Female Genitalia of this Insect.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 445–463. With 3 plates.

This is a careful and very particular description of the genital structures of the bedbug, both male and female, and of their development. It is shown that the claw-like structure commonly styled penis is not a penis at all, but a penis-sheath or guide.

A. A.

CUNLIFFE (N.). **Some Observations on the Biology and Structure of** *Ornithodorus moubata*, **Murray. Together with a Note on the External Characters which serve to differentiate the Sexes** (by G. H. F. NUTTALL).—*Parasitology.* 1921. Nov. Vol. 13. No. 4. pp. 327–347. With 5 text figs. and 1 plate.

In these observations it is recorded that pairing may take place between *Ornithodorus moubata* and *savignyi*, and that ovipary may follow, but that the eggs were not fertile; that no satisfactory evidence of parthenogenesis was observed in *O. moubata*; that with ticks of this species kept under laboratory conditions at 22°, 30° and 37° C., the change from 22° to 30° C. resulted in doubling the rate of ovipary, diminishing the fertility of the eggs by 30 per cent., and shortening the span of life of the female by 40 per cent., while the change to 37° C. almost entirely inhibited reproduction and shortened the span of life by 80 per cent.; and that adults of this species do not moult.

As regards the development of *O. moubata*, only 36·3 per cent. of 1,233 eggs were reared to the adult stage, 22° C. being found a more favourable temperature than 30° C. The number of moults before maturity was from four to six for males, and from five to seven (exceptionally eight) for females; the time occupied in development from egg to adult ranged from 64 to 104 days at 22° C., and from 36 to 72 days at 30° C., the amount of nutriment taken during the process not making much difference, within reason; but moisture was found to be unfavourable to vitality, and excess of moisture fatal. The number of teeth of the hypostome was observed to increase at each moult; the new-hatched larva has only four teeth altogether, namely, two files of two each; in the sixth and seventh stage nymphs there are three, increasing posteriorly to five, files of many teeth, on each side of the hypostome. The frills on the extensor surface of the tarsi and protarsi are absent in the larva, and do not become as prominent as those of the adult until the sixth and seventh nymphal stages; their successive changes in the fourth pair of legs are graphically illustrated. The form of the spiracle also changes in the course of development.

A. A.

DUNN (Lawrence H.). **Studies on the Iguana Tick,** *Amblyomma dissimile*, **in Panama.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 7–18.

Adult females of *Amblyomma dissimile* were observed to remain attached to a snake host for from 15–36 days. No precise observations were made as to males, but two have been attached to a snake for seven months.

A replete detached female gave issue to 9,254 eggs in the course of 35 days. The average incubation period for eggs was 40 days.

Larvae provided with a host remained attached for varying terms, usually 13 days; but some remained attached to the end of their nymphal stage.

Of the replete larvae that detached themselves, the change to the nymphal stage commonly occupied 14 days.

Nymphs provided with a host remained attached for 11–22 days before dropping off. Thereafter the change from nymph to adult occupied 8–16 days.

As regards longevity apart from a host: under conditions of reasonable moisture, larvae could live for 228 days, nymphs for 162 days, adult females 147 days.

As regards other vicissitudes: an unfed female was rescued alive on the seventh day of complete submersion under water.

A. A.

DUNN (Lawrence H.). **The Tick as a Possible Agent in the Collocation of the Eggs of** *Dermatobia hominis.*—*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. Jan.–June. Vol. 11. Pt. 1. pp. 21–25.

The author's colleague of the Pathology Department, when in the field, was molested by ticks on three separate occasions. Five ticks in all were removed from his body, four of them from parts well protected by clothing. In every case the individual bites were well treated, after complete removal of the tick, with tincture of iodine. In every case the wound, instead of healing, remained indolent and subsequently became inflamed. In every case the inflamed wound was found to harbour a small larva of *Dermatobia hominis*. To make sure of the identification, one of the larvae after removal was entertained with a guinea-pig, in whose skin it grew into a specifically certain *D. hominis* larva 20 mm. long.

The ticks were not kept, but on circumstantial evidence were believed to be *Amblyomma cajense.*

We may agree with the author's reasonable inference that ticks carried the eggs of the fly in these cases, and also prepared the road for the larva.

A. A.

DODD (Sydney). **Tick Paralysis.**—*Jl. Comp. Path. & Therap.* 1921. Dec. Vol. 34. No. 4. pp. 309–323.

This excellent paper contains, besides details of experimental observations, a good historical review of Australian experience, beginning in 1884 with BANCROFT, and a bibliography of the subject.

Tick paralysis occurs mostly in the young; the author has heard of very few cases in adult animals, and does not know of an authenticated case in adult human beings. It is believed, though a single chance observation made by the author does not confirm the belief, that the indigenous animals of Australia are immune. In susceptible individuals the bite of a single tick is enough to cause grave symptoms and even death.

Symptoms are manifested some days after the tick has attached itself; the earliest are loss of appetite and vomiting; then gradual motor paralysis, first of the hind-quarters and afterwards extending generally; finally coma and death from failure of respiration. The pulse does not seem to be much affected. Recovery may take place, particularly if the tick is removed in the earlier stages, but not after paralysis has become general. If the tick is properly removed quite soon after its attachment symptoms do not occur.

In the author's experiment with a guinea-pig of 820 gm. symptoms began on the fifth day after a single tick had attached itself. The hind-quarters gradually became paralysed and then the fore limbs; at times the breathing was stertorous. Next morning (sixth) the animal was found dead, the tick being still adherent and almost replete. At the post-mortem investigation there was great extravasation for about an inch round the site of the attachment, the bladder was full of milky urine, the apices of the lungs were intensely congested and the coronary vessels were engorged. The blood appeared normal and was not infective to another guinea-pig.

In an experiment with an almost full grown Pomeranian dog, symptoms began—on the seventh day after a single tick had attached itself—with vomiting, stretching and yawning, slight loss of co-ordination in the hind legs and loss of spirit. On the eighth day the hind-quarters were completely paralysed, and the paralysis extended forwards, respiration became affected, food and water were refused and there were continual attempts at vomiting. On the ninth morning the animal died in a state of coma; the tick was still attached and not full to repletion. The blood and cerebro-spinal fluid were not infective to a guinea-pig.

The ticks in both experiments were *Ixodes holocylus.*

In another experiment with an adult fox terrier nothing happened, although the tick remained attached for six days and fed to repletion. The previous history of the dog is not known.

A. A.

LAWRENCE (Herman). **Further Observations upon the Pathogenicity of *Demodex* (Owen) in the Human Being and of Other Parasites producing Skin Diseases.**—*Med. Jl. Australia.* 1921. Nov. 12. 8th Year. Vol 2. No. 20. pp. 419–425. With 13 text figs.

An interesting excursion among the mites, Demodex, Dermanyssus, and some other small acarines that by chance may cause trouble to man. We are also introduced to a Carabid beetle suspected of biting a man, and to an illustration of the stunting effects of irradiation upon silkworms—effects which suggest to the author the practical application of radium in the treatment of skin disease due to the presence of acarines.

A. A.

NAGAYO (Mataro), MIYAGAWA (Yoneji), MITAMURA (Tokushiro), TAMIYA (Takeo) & TENJIN (Satoru). **Five Species of Tsutsugamushi (the Carrier of Japanese River Fever) and their Relation to the Tsutsugamushi Disease.**—*Amer. Jl. of Hyg.* 1921. Sept.–Nov. Vol. 1. No. 5–6. pp. 569–591. With 1 chart & 8 plates.

There appear to be at least five species of Trombidiid mites which have been defined as tsutsugamushi, but only one of them, *Trombicula akamushi,* is of significance in the transmission of Japanese River Fever (tsutsugamushi disease) to man. The disease occurs only at the time of year when the larvae of this species appear. From the fact that the disease can be communicated to monkeys by inoculating an emulsion of the crushed bodies of the adult mites, it is assumed that the larvae inherit the specific infection from their parent.

A. A.

REICHENOW (Eduard). **Intrazelluläre Symbionten bei blutsaugenden Milben und Egeln.** [The Intracellular Symbiotes of Bloodsucking Mites and Leeches.]—*Arch. f. Protistenk.* 1922. Vol. 45. No. 1. pp. 95–116. With 8 figs. in text.

ROUBAUD [this *Bulletin*, Vol. 15, p. 160] has described at considerable length the intracellular fungi of Glossina, which are believed to be in some way auxiliary to digestion. The author of the present paper describes and figures similar intracellular fungi of mites and leeches, and refers to those of the pupiparous Diptera and other bloodsucking insects. He thinks that these fungi may have some pathological significance for the vertebrates upon which the insects that harbour them feed.

A. A.

i. KIEFFER (J. J.). **Nouvelles observations sur les diptères piqueurs de la tribu des Ceratopogoninae.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 262–268. With 2 text figs.
ii. HOFFMANN (W. H.). **Sobre la mosca,** *Chrysops costata* **Fabr., que chupa la sangre del hombre, observada en Cuba.**—*San. y. Benefic. Bol. Ofic.* 1921. Sept. Vol. 26. No. 3. pp. 121–122. With 1 plate.
iii. YAKIMOFF (W. L.). **Contribution à l'étude des Ixodidés de Russie.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 41–46.

i. Descriptions of *Culicoides langeroni* and *Holoconops mediterraneus*, n. spp., and notes on *Mycterotypus bezzii* Noc and *Acanthoconops*.

ii. Figure and some remarks on the habits of this species.

iii. A list of the Ixodidae of European and Asiatic Russia, with a list of their hosts and a list of the blood parasites that they disseminate.

A. A.

HILDEBRAND (Samuel F.). **Top Minnows in Relation to Malaria Control, with Notes on their Habits and Distribution.**—*Public Health Bull.* 1921. May. No. 114. pp. 7–33. With 32 figs.

This excellent pamphlet, if it does not contain anything very new, gives an admirable account of certain Cyprinodont fishes of the southern states of America, and of the usefulness of some of them in keeping Anopheles mosquitoes in effective check; it is well printed and is plentifully illustrated with figures of the fishes and appropriate views of ponds and ditches.

Of all the species observed, *Gambusia affinis* is said to be the most useful. It is adaptable and it frequents the places favoured by mosquitoes. It becomes mature in four months and produces new broods at intervals of three to six weeks during the warm weather.

Another serious enemy of the mosquito is *Heterandria formosa*, which also produces new broods at short intervals.

These " top minnows " have their most effective application in permanent ponds and lakes that it is impossible or inconvenient to drain.

A. A.

van Someren (W. H.). **Report on a Short Small-Mammal Survey and the Distribution of *Rattus rattus kijabius* in the North Kavirondo District.** [MS. Report, dated Dec. 2, 1921, received from the Colonial Office.]

Report of a six months' survey of villages in the North Kavirondo District of the Nyanza Province, Kenya Colony, with the main object of determining the exact distribution of *Rattus rattus kijabius*, a plague carrier, now common in native dwellings, but said to be a recent immigrant gradually supplanting a multimammate rat known in the vernacular as *muunchu.* The report shows that both *kijabius* and *muunchu* are found as true house rats in the area surveyed, and that though usually they do not occur together in the same house, there are places where they do. A good deal of native evidence was collected in some villages to the effect that *kijabius* was a recent arrival; and although it is quite impossible to follow the details of the report without a large-scale map, there does seem to be some evidence that the spread of *kijabius* is a true invasion.

It is noted that no other rodents were found in houses occupied by a small species of dormouse, and that the natives have a tradition that this dormouse scares rats away.

A. A.

Hazra (M. M.). **Practical Notes on Thirty-five Snake Bite Cases and their Treatment with Different Drugs.**—*Indian Med. Gaz.* 1921. Nov. Vol. 56. No. 11. pp. 404–408.

Although these cases, 13 of which are described, are interesting, they are not so very instructive, since the essential terms of the argument are not, in the language of the great philosopher of Malmesbury, sufficiently "purged and snuffed from ambiguity." For instance, when the author states that in cases of viper bite he did not get any satisfactory results from antivenene, and, therefore, preferred to give intravenous injections of iodine, he does not define the antivenene used.

The cases seem to have been treated on approved principles—ligature, local injection of permanganate or of gold chloride, and intravenous injection of antivenene—but, though they include bites of pit-viper, cobra, krait, varanus lizard and other unidentified species, in no instance is there any specific statement of the nature of the antivenene employed in the individual case.

For intravenous injection of iodine 10 minims of a 3 per cent. solution of tincture, in 1 cc. of distilled water, was used.

A. A.

Michael (D. F.). **An Unusual Case of Snake-Bite.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. pp. 17–18.

The patient in this case was seen seven and a half hours after he had been bitten on the forefinger by a full-sized cobra. He was unable to stand or to sit up, there was marked ptosis, the speech was indistinct and very nasal; deglutition was difficult and fluids regurgitated through the nose, and there was restlessness and dyspnoea. The whole of the hand was greatly swollen and without sensation.

A ligature was applied, solid $KMnO_4$ was rubbed into the bite, and the whole hand was infiltrated with about 5 cc. of a 5 per cent. solution of gold chloride; also a hypodermic injection of strychnine and digitalin was given.

The patient was not brought to hospital, and was not seen till six days afterwards, when he walked in, " displaying a very gangrenous-looking hand and arm, but otherwise quite well."

A. A.

DO AMARAL (Afranio). **Um novo sôro anti-peçonhento. (Sôro anti-crotalico norte-americano.) Nota prévia.** [A New Anti-Venomous Serum.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Series. Nos. 5 & 6. pp. 134–136.

Before using a supply of venom of *Crotalus confluentus*, Say (=*C. atrox*, Cope) for immunization purposes, the author verified its properties. He finds that it is much more haemolytic than that of *C. terrificus* and comparable in this property to *Lachesis jararacussu*; that it is anti-coagulant ; and is proteolytic in about the same degree as that of *Lachesis atrox*.

A. A.

HOUSSAY (B. A.), OTERO (M. J.), NEGRETE (J.) & MAZZOCCO (P.). **Action des venins coagulants de serpents sur le sang.**—*C.R. Soc. Biol.* 1922. Feb. 18. Vol. 86. No. 7. pp. 411–412.

Except for a few refined biochemical particulars of interest to the specialist, this short paper contains nothing not already known regarding the action of coagulant venoms upon the blood.

A. A.

CAVASSA (Nicolas E.). **A propósito de algunos casos de aracnoidismo observados en Pacasmayo.**—*Crónica Méd.* Lima. 1921. Sept. Vol. 38. No. 699. pp. 298–301.

Brief notes of three cases of severe local and constitutional symptoms caused by the venom of two spiders here referred to by the vernacular names of " luna " and " yacomé."

A. A.

BAERG (W. J.). **The Effect of the Poison of Tarantulas.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 86–89.

The " tarantula " of these unsatisfactory experiments was *Eurypalma steindachneri*, one of the large Aviculariine spiders. The effects of the poison are not very clearly stated ; they seem to have been not serious.

A. A.

SUTHERLAND (J. W.). **Treatment of " Red-Back " Spider Bite.** [Correspondence.]—*Med. Jl. Australia.* 1921. Dec. 31. 8th Year. Vol. 2. No. 27. p. 632.

SUTHERLAND (J. W.); VANCE (E. B. M.); WALLMAN (D. Robson). **" Red-Back " Spider Bite.** [Correspondence.]—*Ibid.* 1922. Jan. 21. 9th Year. Vol. 1. No. 3. p. 84 ; Jan. 28. No. 4. p. 113 ; Feb. 4. No. 5. p. 139.

These are references to the effects of the bite of the notoriously venomous spider *Lathrodectes hasselti*, found in the Australian and Oriental Regions ; it seems to be common in summer in some parts of Australia.

The spider commonly hides under the seat of closets, so that the genitals are most likely to get bitten. The symptoms are excruciating pain, usually extending to the legs and back, and very profuse sweating, and they may last for three or four days. The pain passes into numbness, tingling, paresis, or even temporary paralysis. There may also be cardiac distress and syncope.

The best local treatment seems to be that for snake-bite, *e.g.*, application of permanganate of potash.

[Writers usually call the spider, Latrodectus or Lathrodectus ; the correct designation is Lathrodectes (*λαθροδῆκτης* = biting secretly).]

A. A

JOHNS HOPKINS UNIVERSITY. **Activities of the Department of Medical Zoology, School of Hygiene and Public Health, Johns Hopkins University.** [Mimeographed MS.]

The teaching embraces Protozoology, Helminthology, and Medical Entomology in their taxonomic, morphological, physiological, bionomic, pathological, and preventive aspects. Besides the ordinary courses there are special three weeks' courses in Medical Zoology for Health Officers, and short " intensive " courses for Public Health Officers. A club meets once a week to read and discuss a paper. Once a month during the school year the members of the department and others interested meet in the evening to discuss some phase of medical zoology. Besides the school library other libraries of the University and local societies are available, and the library of Congress and that of the Surgeon-General at Washington are accessible by post. Visiting communion with many other laboratories in the country is established and flourishes. Field work is carried on by expeditions ; regions where malaria, hookworm, and soil pollution are prevalent are easily accessible. Since its organization in 1918 the department has brought together representative collections, including living forms, for educational purposes ; exchanges are solicited and additions are welcomed. Since 1918 the department has issued 63 publications, describing the results of various original researches.

A. A.

HAUGHWOUT (Frank G.). **Some Less Familiar Aspects of Parasitology.** —*Jl. Philippine Islands Med. Assoc.* 1921. May–June. Vol. 1. No. 3. pp. 93-99.

The author has a good deal to say on the old texts of all the philosophers—ancient and modern—that science must be pursued for its own sake ; that the study of science for the sake of its practical applications is as barren and futile as the set pursuit of happiness ; that the gainful applications of science are but unforeseen by-products—the texts, alas, are something musty. He, however, thinks that " there is a growing tendency on the part of the world to accept the principle "—the eternal truth—embodied in these texts, and he justifies his hopeful opinion by some consideration of the converse aspects of DARLING's attractive theorem that by examination of the intestinal worms of a people the geographical and ethnic origins of that people can, within certain limits, be divined. The unravelling of ethnological problems by a study of intestinal parasites is pure science, but science fruitful in practical applications. In the case of the Philippine Islands, where the predominant species of hookworm appears to be the less malignant Necator, the author would apply this science to legislation for controlling the immigration of ethnological elements whose predominant hookworm is known to be the more malignant *Ancylostoma duodenale.* The paper is suggestive and stimulative and well worth reading.

A. A.

GALLI-VALERIO (B.). **Beobachtungen ueber Culiciden, nebst Bemerkungen ueber Tabaniden und Simuliden.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Jan. 31. Vol. 87. No. 7/8. pp. 557–560.

HOUSSAY (B. A.) & NEGRETE (J.). **Proportions de neutralisation des venins par les sérums anti-venimeux.**—*C.R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 999–1001.

LAWRENCE (Herman). **The Pathogeneity of the** *Demodex folliculorum.*—*Australasian Med. Congress, Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 543–544.

LEIVA (Lamberto). **Observations on** *Chilomastix intestinalis* **Kuczinski.**—*Jl. Parasit.* 1921. Dec. Vol. 8. No. 2. pp. 49–57. With 2 text figs. & 1 plate.

MARTINI (E.). **Ueber ein gutes Unterscheidungsmerkmal von** *A. plumbeus* **und** *A. bifurcatus.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 364–365.

MARTINI. **Ueber den Einfluss der Wasserzusammensetzung auf die Kiemenlänge bei den Mückenlarven.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 3. p. 82.

SAITO (Tokiwo). **[On the Intestinal Parasitism by the Larvae of the Fly, and some Experiments on the Larvae of** *Chrysomyia macellaria.*]—*Igaku Chuo Zasshi* (*Central Jl. of Med.*). 1921. Apr. No. 347. [Summarized in *Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. 3. p. 21.]

SIKORA (H.). **Zur Unterscheidung von Kopf- und Kleiderläusen.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 3. p. 83.

SWELLENGREBEL (N. H.). *Myzomyia ludlowi* **Theob. parvient-elle à ressembler à** *Myzomia rossii* **Giles, quand elle vit en rapport intime avec cette dernière espèce ?**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 120–122.

VOGEL (R.). **Ueber Vorkommen und Biologie von Anopheles im Bereich des Etappengebietes der 5. Armee (östliches Frankreich und angrenzendes Belgien).**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 9. pp. 279–284.

SLEEPING SICKNESS.

MURAZ (G.). **Essai de détermination de la limite Nord de la maladie du sommeil en Afrique équatoriale française. Travaux du secteur de prophylaxie du Tchad d'avril 1920 à avril 1921.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 253–280. With 1 map.

After spending almost a year working on sleeping sickness in the Upper Sangha district, the author went to the Chad region, which is the most northerly sector of French equatorial Africa, and spent from April, 1920, to April, 1921, investigating the state of affairs as regards sleeping sickness. A detailed account is given of the zones visited and of the amount of the disease found in each, and of the various measures of treatment and prophylaxis used. The paper is illustrated by a large scale map of the region.

The conclusions are :—

1. It appears that the disease has not been recently imported into Southern Chad. The depopulated villages (Kolo, Biokobo) on the Logone-Penndé bear witness to the fact that it has been endemic for a long time.

2. Sleeping sickness has become epidemic to Chad during recent years, especially along the Tandjilé, the Logone-Penndé, and the Bahr Sara. Large zones which are almost free (Koumra plateau and the Goule country) separate zones severely infested (50–90 per cent.).

In the whole sector 134,608 people have been examined within the year, and 3,071 cases have been diagnosed and treated.

3. The northern limit of the disease in French Equatorial Africa runs between 9° and 10° N., forming two great northern bends, of which the Chari and the Logone are the axes.

4. The extension of human trypanosomiasis to the north of the line is not to be feared :

(*a*) If the prophylactic work of the Chad sector is continued.

(*b*) If the rôle of the three " Poste filtres " at Fort Archambault, Laï and Léré is not interrupted.

(*c*) Because the geographical conditions seem opposed to its extension. The habitat favoured by *G. palpalis* is the forest country, which disappears almost at the northern line. If the combined efforts of the Chad sector and the three " Poste filtres " defend this Colony against endemo-epidemicity, the new geographical conditions which *G. palpalis* finds north of 10° N. assure us against extension of the endemicity.

5. In the Chad sector chemical prophylaxis gave excellent results. By means of it in 1920–21, the great epidemic foci have been stamped out in the Mayo-Kebbi, Moyen Logone and Moyen Chari.

6. The minimum atoxyl treatment—two massive doses at a day's interval each six months—is the only one compatible with active prophylaxis in the bush carried out by few people.

7. The suppression of porterage on the river up to Batangafo is under consideration. This important measure would certainly reduce the fatalities from trypanosomiasis, since the general condition of the native would no longer be ruined by the enormous strain involved.

W. Yorke.

JOJOT (Ch.). **Le secteur de prophylaxie de la maladie du sommeil du Haut-Nyong (Cameroun).**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Oct.-Nov.-Dec. Vol. 19. No. 4. pp. 423-442. With 1 plate and 1 map.

A detailed description is given of the efforts to combat sleeping sickness in the Haut-Nyong sector of the Upper Sangha district.

The conclusions are :—

More than 5,000 cases of trypanosomiasis have been diagnosed microscopically, provided with tallies, and atoxylized.

Ninety per cent. of these cases are regularly examined and treated.

The atoxylization causes at first the disappearance of trypanosomes from the periphery (blood and glands) in 95 per cent. of cases.

The mortality among the treated cases varies between 10 and 15 per cent.

Prophylactic and curative treatment are so much the more efficacious as the supervision of the cases is the more prolonged.

Sanitary stations are being multiplied for treatment of the sick, and they are provided with mobile bands, which are penetrating more and more intimately among the native population.

The results already obtained enlist the confidence and regard of the natives for the sanitary service : the author recommends multiplication of the native collaborators of both sexes and extension of their rôle, and appealing by persuasion and example in order to lead the entire population to participate in a work the beneficence of which they understand already and will realize more and more.

W. Y.

SCHWETZ (J.). **Extrait du Rapport de la Mission médicale antitrypanosomique du Kwilu-Kwango, 1920-1921.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 339-365. With 1 map.

In 1919 the author was put in charge of the sleeping sickness operations at Kwango. He proposed to organize the work as follows :—

A doctor, accompanied by several native hospital attendants, would be sent to examine the villages of a definite area with the object of discovering cases of the disease and of giving patients their first injection of atoxyl. After having examined 10-20 villages (according to the size of the villages, the distance between them, and the number of patients), a hospital attendant would be left to continue the treatment, which would consist of an injection of atoxyl every tenth day. Records of the patients and treatment administered were to be kept, and a copy sent to the sanitary officer who would visit the district sometime later, in order to control the work of the native hospital attendant, to ascertain the number of absentees, and to hunt out refractory cases.

When the doctor had visited in this way about 100 villages and placed seven or eight hospital attendants in charge—that is to say, after about three months—he would make another tour to see that everything was being carried out properly. After the administration of 10 injections, that is, after a lapse of about six months, the region in question was to be temporarily abandoned, and the doctor, the sanitary officer and the hospital attendants to commence work in a neighbouring district. When the work was complete in the second district, the first was again to be visited to ascertain the results of treatment and to give a further series of 5 injections to all cases, whether they appeared well or not.

Diagnosis was to be made by means of gland palpation, and the use of the microscope reserved for special cases. The doses of atoxyl to be administered were 1 gm. for an adult and 0·5 gm., or less, according to the age, for children.

In practice the author found that his programme was too ambitious, and that instead of working simultaneously in three districts, they had to limit themselves, to begin with, at least, to a single region. The idea of employing in the same region two Europeans—a doctor and a sanitary officer—at the same time had to be abandoned. Owing to the number of villages to be examined, the great number of patients to be treated and the difficulties encountered, the hostility of the native, the lack of hospital attendants and the necessity of perpetually controlling their work, the author was compelled to divide the territory into several sub-districts, with a European in charge of each. Many other difficulties encountered are dealt with at length.

A detailed account of the work done in the Kikwit district is given, including geographical details, the character of the vegetation and the distribution of Glossina, including *G. tabaniformis*, which is fairly common in the forests around Kikwit, and *G. palpalis*, which is, in general, rare.

The population of the Kikwit region is about 100,000, of which over 73,000 were examined for sleeping sickness, and the sick to the number of about 9,000 treated.

Details are given in the following table :—

Regions.	Number of Villages.	Number of Persons Examined.	Disease.	Per Cent.	No. of Persons Treated.
1. Right bank Kwilu .. (Dr. David).	239	17,082	2,131	12	2,835
2. Triangle Kwilu-Kwengo (Dr. Segers).	21	1,371	266	19·4	245
3. South de Kikwit .. (Dr. Schwetz).	48	8,214	1,325	16·1	1,148
4. Lutshima .. .. (Dr. Baumann).	71	14,372	2,022	14	1,878
5. West Bas-Kwengo .. (Dr. De Wolf).	39	3,829	663	17·3	605
6. South-west of the basin Kwengo .. .. (M. Demaret).	203	28,681	2,515	11·4	2,307
Total ..	621	73,549	8,922	12·1	9,018

The paper is illustrated by an excellent map of the Kikwit district.

W. Y.

BASSETT-SMITH (Percy). **Case of Trypanosomiasis from West Africa cured by Antimony.**—*Brit. Med. Jl.* 1922. Feb. 25. p. 311.

Further details are given of a case of sleeping sickness contracted in the Cameroons in 1915 (see this *Bulletin,* Vol. 13, p. 260). Atoxyl controlled, but did not eradicate, the infection. Under antimony treatment the blood cleared rapidly. In May, 1917, there was a relapse, which again subsided on the administration of antimony. The patient had a course of 10 injections of ½ to 2 gr. of tartar emetic each spring in 1918, 1919 and 1920. The author concludes that the case may now be claimed as a severe infection of *T. gambiense* cured by repeated injections of antimony.

W. Y.

LOW (George C.) & NEWHAM (H. B. G.). **Case of Trypanosomiasis from Portuguese East Africa apparently Cured.**—*Brit. Med. Jl.* 1922. Jan. 21. pp. 96–97.

Further details are given of the case of a sleeping sickness patient who three years after acquiring an infection of *T. rhodesiense* in Portuguese East Africa is apparently well and in good health [this *Bulletin,* Vol. 15, p. 36]. The patient was infected in October, 1918, in the Lugenda River valley, and trypanosomes were found in the blood on October 16. Treatment consisted of intravenous injections of tartar emetic. In January, 1919, the patient was transferred to Durban, and came under the care of Dr. MURRAY. A prolonged course of treatment was commenced on January 21, and was continued till the patient was sent to Johannesburg on October 8, 1919. Here he was kept under continual observation and treatment until May 7, 1920. A few trypanosomes were found in the blood on his arrival at Johannesburg, but not between October 17, 1919, and April 8, 1921, in spite o daily examinations.

The total medication at the commencement of treatment on November 19, 1918, to April 8, 1921, was as follows :—

Atoxyl	13	gr.
Soamin	234	gr.
Nucleoarsitol	13·5	cc.
Galyl	0·5	gm.
Liq. arsenicalis—a little on hospital ship between Dar-es-Salaam and Durban.		
Tartar emetic	363	gr.
Antimony oxide	4·75	gr.

On April 29, 1921, the patient was sent to England, and was admitted to the Hospital for Tropical Diseases, London. As there were no signs of disease, it was resolved to stop treatment. Blood examinations were uniformly negative, as were also sub-inoculations into guinea-pigs and rats. In July, 1921, he complained of the sight in one eye, and was examined by Colonel ELLIOT, who reported that there was a patch of paracentral choroido-retinitis in the right eye, a condition only twice before reported in human trypanosomiasis.

The authors say that it is difficult to be certain whether the patient was really cured. Tremors of the hands seem to be definitely increasing and the general condition, although very good, is not perfect.

During the autumn months of 1921 the patient kept well; he returned to hospital for another examination in November. A lumbar puncture was made with negative results

W. Y.

COLIN (H.), LAIGNEL-LAVASTINE & MOURGUE (R.). **Étude clinique et anatomo-pathologique sur un cas de syndrome paralytique à trypanosomes.**—*L'Encephale.* 1919. Dec. (9e–14e année. 2e sem.). No. 10–12. pp. 311–329.

The authors describe in great detail the clinical history and pathological lesions found in a case of sleeping sickness from the Upper Sangha.

The patient did not develop cerebral symptoms until ten years after infection. The chief post-mortem findings were extraordinarily well-marked lesions in the central nervous system, which were essentially meningo-vascular. There was a superficial infiltration of the pia mater, and of the vascular zones of His, with lymphocytes and plasma cells.

The article is illustrated by two plates: the first, a low power magnification of the cerebral substance showing the extraordinarily well-marked perivascular infiltration, and the second, a high power magnification of a vessel showing the characters of the cells constituting the perivascular infiltration.

The authors were of opinion that the fact that the morbid meningo-vascular changes had attained such a high degree of development was due to the prolongation of life as a result of therapy.

W. Y.

TROUT (Charles Lewis). **Treatment of Trypanosomiasis by Various Methods.**—*Jl. Trop. Med. & Hyg.* 1921. Dec. 15. Vol. 24. No. 24. pp. 321–322.

After referring to MARSHALL's recent articles on the treatment of trypanosomiasis by intrathecal injections of salvarsanized serum, the author states that various groups of from three to five cases in each group are being treated by the Swift-Ellis auto-serum technique with the following drugs: galyl, tincture of iodine (4–7 drops in distilled sterile water injected slowly, repeated twice before removing blood), urotropine (10 per cent. solution injected twice before drawing blood) and tartar emetic. Galyl, urotropine and tartar emetic cases are reported all to have improved.

Another group of five advanced cases are being treated by a plan based on Duncan's autotherapy method. Blood (containing trypanosomes), 20 cc., is withdrawn into a sterile tube, and some time later triturated with ground glass very thoroughly in a sterile mortar and 200 cc. of distilled sterile water gradually added. The solution is allowed to stand and then passed through a Berkefeld filter. About 100 cc. of the filtrate is injected. A number of early cases have been treated simply with their own serum, no drugs being administered. Sufficient time has not yet elapsed to reach conclusions as to the value of any of these drugs for treatment.

W. Y.

LEFROU & OUZILLEAU. **La thérapeutique intra-rachidienne dans la maladie du sommeil.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 59–80.

The authors summarize the various methods of intrathecal treatment of human trypanosomiasis which have from time to time been recorded. They deal first with the observations relating to intrathecal injections of trypanocidal substances, *e.g.*, salvarsan and neosalvarsan, emetic and collosol trisulphurate of arsenic (Thiarsol). Having obtained a supply of the last-named drug from the Maison Clin, the authors, before administering it intrathecally, decided to try it intravenously on four early cases who exhibited trypanosomes in the glands or blood, but whose cerebrospinal fluid was normal. The injections were well borne, but gave rise to a transient febrile reaction—38° C. after 1 cc. (0·002 gm. As) and 40° C. after 2 cc. The results were not very satisfactory, as in three of the patients the trypanosomes remained in the blood. Notwithstanding this, the authors thought that possibly the drug might act better intrathecally, as the volume of the cerebrospinal fluid is so much less than that of the blood. It was consequently given in doses of 1 cc. intrathecally in three patients whose cerebrospinal fluid contained parasites; two injections being given in each of the first two cases and one in the third. The results were unsatisfactory after a temporary disappearance of the parasites; the patient became paraplegic, the progress of the disease was accelerated and the patient died.

The authors next considered the various methods of intrathecal serum therapy with salvarsanized and atoxylized serum. Much astonished at the results obtained by MARSHALL [this *Bulletin*, Vol. 19, p. 141], they decided to repeat the experiments. Four patients, the cerebrospinal fluid of whom contained trypanosomes and a definite increase of cellular elements, were treated with salvarsanized serum. In none was the cerebrospinal fluid sterilized or the cellular elements reduced in number; three of four died, and the fourth was subsequently given injections of atoxyl subcutaneously and improved in condition. Details are also given of a number of cases treated with atoxylized serum. The authors point out that in work of this sort it is necessary, in order to appreciate the value of the intrathecal injection, to know the influence exerted by each of the two factors which compose the treatment, *i.e.*, the intravenous injection of neosalvarsan or the subcutaneous injection of atoxyl, and the intrathecal injection of the serum. Details are given of five cases treated only by intravenous injections of neosalvarsan, and of five treated by injections of atoxyl or emetic. In all of these the effect of treatment on the cerebrospinal fluid was observed by frequent lumbar punctures. The authors infer from the results that injections of neosalvarsan or atoxyl alone produce the same effect as the injection of the serum.

The next section is devoted to criticism of MARSHALL's papers; this is, in the main, very similar to that of the reviewer [this *Bulletin*, Vol. 18, pp. 155–174]. Referring to MARSHALL's assertion that after a single injection of neosalvarsan or atoxyl symptoms reappear in about four months, and the disease progresses to a fatal issue, the authors give details of five cases, recorded in the archives at the Pasteur Institute, Brazzaville, who, although they had only one or two injections, were alive, and in excellent health 6–12 years afterwards. They also give details of another case, the cerebrospinal fluid of which was infected; this was sterilized and the patient possibly cured by two intravenous injections of neosalvarsan.

The paper ends with certain general conclusions on intrathecal therapy, in which the authors state their belief, on physiological and pathological grounds, that the intrathecal path does not present any superiority over the blood path as a means of reaching the cerebrospinal system.

W. Y.

BRODEN (A.) & RODHAIN (J.). **L'Atoxyl dans le traitement de la trypanose humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 179–226.

The object of this paper is to complete, and in part to confirm, the conclusion reached in Rapport iii of the Leopoldville Laboratory (1908). [*Sleeping Sickness Bulletin,* Vol. 1, p. 190.] The authors consider successively the effect of atoxyl (*a*) in doses of 0·5 gm. every tenth and eleventh day as recommended by KOCH, (*b*) in weekly doses of 1 gm., and (*c*) in doses of 0·5 gm. every fifth day.

In presenting their records, the authors have grouped their cases into two classes: (1) those in the first stage of the disease, and (2) those in the second stage. The former comprises those who exhibit glandular enlargement, fever, slight acceleration of the pulse and a normal cerebrospinal fluid, or at most one with only a slight leucocytosis; all cases exhibiting any nervous trouble are grouped in the second category, irrespective of their general condition.

Details are given of 165 cases treated with atoxyl alone by one of the above methods, and also of 17 cases which received another form of atoxyl treatment consisting of oral administration alternating with subcutaneous injection, sometimes combined with a little mercury.

Patients in the second stage of the disease :—

Of 40 patients treated by method (*a*), 16 are dead; there is no instance of apparent cure, and 7 cases developed severe visual troubles, 4 becoming blind.

Of 2 patients treated by method (*b*), 1 died and the other is not cured.

Of 5 patients treated by method (*c*), 2 died and the remaining 3 are not cured.

Of 8 patients treated by other atoxyl methods, 3 are dead and none are cured.

Thus, of 55 patients treated in the second stage of the disease, none were cured.

Patients in the first stage of the disease :—

Of 77 cases treated by method (*a*), 21 were apparently not cured.

Of 30 cases treated by method (*b*), 8 were apparently not cured.

Of 11 cases treated by method (*c*), none were observed for a period sufficiently long to warrant the expression of any opinion.

Of 9 cases treated by other atoxyl methods, 4 were apparently not cured.

Thus, of the 127 patients in the first stage of the disease treated with atoxyl for months by various methods, 34 are apparently not cured: the proportion of failures is then 26·7 per cent. for an observation period in general considerably less than two years.

The authors have not considered in the above classification the number of cases apparently cured, because the observation period in some of them was too short, and because more than half the cases were not followed up.

The general deduction appears to be that one cannot hope to obtain a cure by atoxyl alone in patients in the second stage of the disease. Nevertheless, the drug has a very marked relative utility, in that it sterilizes the peripheral circulation and ameliorates for the time being the general condition of the patient.

Although atoxyl proved insufficient in 26·7 per cent. of patients in the first stage of the disease, it is nevertheless certain that a number of the patients of this category have been definitely cured.

Reference is made to the fact that grave ocular troubles, including atrophy of the optic nerve and blindness, were met with. Of 117 patients treated by KOCH's method, severe visual disturbances occurred in 10 and blindness in 7 cases. The 65 patients treated by other methods did not yield a single case of blindness. The authors state, however, that they do not wish to ascribe this disaster as peculiar to KOCH's method.

In answer to the question "Which is the best method of administering atoxyl?" the authors conclude that method (*b*), *i.e.*, a weekly dose of one gramme, is preferable.

They next consider what ought to be the duration of atoxyl treatment, and conclude that in patients in the second stage of the disease, it ought never to be definitely stopped, but only interrupted from time to time. With regard to those in the first stage of the disease, the question is more difficult. In the most favourable circumstances the duration of the first treatment should not be less than 4–6 months, and it should be followed, after intervals more or less prolonged, by shorter periods of treatment.

W. Y.

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i. VAN DEN BRANDEN (F.). **A propos de l'Iodosalyl dans la trypanosomiase humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 163–164.

ii. ——. **Action de l'hexaméthylènetétramine "urotropine" dans la Trypanosomiase humaine.**—*Ibid.* Dec. No. 3. pp. 267–269.

i. Iodosalyl even when administered in larger doses than those recommended by DANIEL [this *Bulletin,* Vol. 15, p. 43 & p. 389] has no appreciable action in trypanosomiasis, nor is it of any value when given as an adjunct to tartar emetic or spamin.

ii. As a result of treating two cases of sleeping sickness with urotropine, the author concludes that this drug, even when administered in larger doses than those used by PELLETIER [this *Bulletin,* Vol. 17, p. 330], has no action beyond that of a general stimulant.

W. Y.

BRODEN (A.). **Action du Trypanbleu sur** *Trypanosoma gambiense.*—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 281–285.

Trypanblue given orally in doses of 18 gm. in three days to natives infected with *T. gambiense* had no effect on the disease; and similarly when given intravenously in doses varying from 0·2–0·8 gm. it failed to cause the disappearance of trypanosomes.

W. Y.

MAYER (Martin) & ZEISS (Heinz). **Ueber die Wirksamkeit des Serums mit "Bayer 205" vorbehandelter Kaninchen.** [On the Activity of the Serum of Rabbits treated with "Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 9. pp. 259–271.

The serum of healthy rabbits previously treated with "Bayer 205" in doses of 0·4 gm. per kilo of body-weight is therapeutically active for *T. brucei, T equinum* and *T equiperdum* infections, and it is possible to cure mice and rats infected with these parasites with rabbit serum removed up to 51 days after treatment with "Bayer 205." The earlier after treatment the serum is withdrawn the greater its therapeutic activity; after the 38th day a slow but steady decrease in the protective power of the serum sets in, and from this time onwards the effects are mainly only transient.

Serum heated after dilution to 56° C., and even up to 100° C., remains completely active.

T. gambiense and *T. rhodesiense* appear to be more able to resist the effect of "Bayer 205" serum than the above-mentioned trypanosomes, and it is possible to drive them out of the blood of experimental animals by the injection of the serum for a few days only; relapses occur and death results.

Reinoculations were made in 16 animals cured by the treated serum two to four months previously and 13 became infected, but the incubation period and course of the infection was greatly prolonged. Two animals inoculated with *T. equiperdum* remained healthy during an observation period of 146 days, and the remaining animal died of an intercurrent disease.

These observations show that the activity of the serum is not due to any changes in the blood, but to the drug actually circulating in the blood for prolonged periods. In a foot-note the authors refer to a previous paper written in conjunction with GIEMSA and HALBERKANN (*Revista médica de Hamburgo,* 1921, No. 5), in which they showed that the drug is bound up with the proteins of the serum

W. Y

MAYER (Martin) & MENK (W.). **Ueber die Ausscheidung von "Bayer 205" in wirksamer Form im Harn behandelter Menschen und Tiere.** [The Secretion of "Bayer 205" in Active Form in the Urine of Treated Men and Animals.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 376–379.

By means of its therapeutic action on trypanosome infections, the presence of "Bayer 205" was demonstrated in the urine of a dog up to the ninth day after treatment, and in that of a man up to the fifth day after treatment.

W. Y.

MAYER (Martin). **Ueber intralumbale Behandlung mit "Bayer 205" bei Trypanosomenkrankheiten.** [On the Intrathecal Treatment of Trypanosomiasis with "Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 375–376.

In a previous paper the author, in conjunction with NAST and ZEISS, recorded the cure of a rabbit severely infected with dourine by intralumbar injection of "Bayer 205." Details of two other similar cases—one a dog and the other a guinea-pig—are given in this paper. The dog, which weighed 14,100 gm., was given 0·7 gm. of the drug and the guinea-pig 0·02 gm. The author recommends that in cases of trypanosomiasis doses of from 0·5–1 gm. should be given in the first experiments on intrathecal therapy.

W. Y.

MAYER (Martin). **Ueber orale Behandlung und Prophylaxe der Trypanosomenkrankheiten mit "Bayer 205."** [On Oral Treatment and Prophylaxis of Trypanosomiasis with "Bayer 205."]—*Muench. Med. Woch.* 1922. May 12. Vol. 69. No. 19. pp. 702–703.

A goat was inoculated with a virulent strain of *T. rhodesiense* [see this *Bulletin*, Vol. 19, p. 134] on December 9, 1921. Trypanosomes were found in its blood on December 15, and were present in great numbers until January 25, 1922. From January 8 onwards severe symptoms manifested themselves. Oral treatment with "Bayer 205" was begun on January 17, the following doses being given :—

January 17	1 gm.	January 25	7 gm.
,, 18	2 gm.	,, 26	10 gm.
,, 19	2 gm.	,, 27	10 gm.
,, 23	3 gm.	,, 28	10 gm.
,, 24	5 gm.		

The result was remarkable ; after the administration of 20 gm., trypanosomes had disappeared from the blood and the symptoms rapidly subsided. During an observation period of 13 weeks the animal remained healthy and its blood negative, and subinoculated animals did not become infected.

A second goat was given by the mouth 20 gm. of "Bayer 205" ; this dose was well borne, and albuminuria was not observed. A week later it was inoculated with the above strain of *T. rhodesiense*. It did not become infected, and the drug could be demonstrated in its blood by the biological test for three weeks after administration.

W. Y.

MAYER (Martin). **Richtlinien für die Anwendung von "Bayer 205" bei Trypanosomenkrankheiten.** [Right Lines for the Use of "Bayer 205" in Trypanosome Infections.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 2. pp. 33–37.

The following rules relating to the administration of "Bayer 205" are laid down for general guidance.

1. The drug is very soluble in water and can be sterilized by heating in a water bath for 15 minutes, but solution in sterile water renders

this unnecessary. Solutions are stable for a long time, but it is desirable to employ fresh solutions. Mayer advises 10 per cent. solution for use in man and the larger animals.

2. It can be given intravenously, subcutaneously, intramuscularly, intrathecally, and orally. The first is best, but in small animals subcutaneously is equally good.

3. The dose tolerated, so far as is yet known, is:—Mice 0·01 gm. per 20 gm. of body-weight, guinea-pigs 0·3 gm. per kilo, rabbits 0·3–0·5 gm. per kilo. For horses, PFEILER recommends 1 gm. per 50 kilos (cwt.) within 14 days, and he gave up to 7 gm. at a single dose, but doses of even 0·3 gm. per 50 kilos may produce exanthema. Sometimes animals die a week or more after the administration of large doses as the result of kidney changes.

4. Large doses act on the blood and on the kidneys; destruction of erythrocytes and anaemia and albuminuria results. After lethal doses there are haemorrhages. Albuminuria is especially to be observed in man, sometimes after quite small doses, and even after quite exceptionally large doses it is not severe. It is important to remember that albuminuria does not appear immediately after an injection, but sometimes some days afterwards. In experiments the object of which is to produce sterilization by means of a single large dose, a great leucocytic reaction may be observed in addition to the damage to the red cells, which, perhaps, is related to the sudden disappearance of parasites, and death through shock may result.

5. The drug circulates in the blood for weeks and even months, and consequently repeated doses must have a cumulative effect. Mayer strongly advises, for the present, the administration of small doses at intervals of several days. Urine examination is necessary, and the appearance of considerable albumen is an indication to stop. Men should be given 0·5 gm. at first, and, if this is well borne, 24 to 48 hours later 1 gm. intravenously; up to 3 gm. can be given within a week, then at least 14 days interval with careful examination of urine. Large quantities should only be given when the drug is well borne. In slight cases and for prophylaxis, 1–2 gm. can be given each four weeks. For intrathecal treatment and severe cases which no longer react to intravenous injections, 0·05 gm. should be given to begin with. Details are given regarding the doses which should be administered to horses and other domestic animals.

6. Trypanosomes frequently do not disappear from the blood until the second or third day after treatment. Sometimes after several weeks single trypanosomes appear in the blood for one or more days, and then without further treatment disappear completely.

7. Cured animals remain immune against homologous and other pathogenic trypanosomes for weeks and months. The length of the immunity varies directly with the size of the dose and inversely with the size of the animal.

8. The drug can be used as a prophylactic, either by giving large doses at long intervals or small doses at short intervals.

9. The degree of immunity can be increased by reinoculating (either naturally or artificially) cured or prophylactically protected animals shortly after treatment.

10. The serum of treated animals and man is of therapeutic value in cases where the drug itself cannot be given. Of especial value is the

serum of animals treated with a large dose of the drug, removed 24 hours to a few days after the injection (possibly this is suitable for intrathecal treatment).

11. Good results have been obtained by intrathecal treatment, either with the drug or with the serum of treated animals, in dogs, rabbits and guinea-pigs in which the spinal canal is infected.

12. A few observations have been made on the oral administration of the drug. Much larger doses are tolerated by this method (in man over 5 gm.).

13. In Mayer's experiments it proved very difficult to obtain the drug-fast strain in small animals.

14. The value of the drug has yet to be tested on other protozoa and worm infections which react to arsenic and antimony preparations, but care must be taken in the treatment of diseases with derangement of the kidney.

W. Y.

PFEILER (W.). **Kasuistische Mitteilungen ueber ein anscheinendes Versagen der Bayer 205-Behandlung bei an natürlicher Beschälseuche leidenden Pferden.** [Remarks on an Apparent Failure of "Bayer 205" in the Treatment of Horses suffering from Natural Dourine Infection.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 48–53.

This paper deals with the official reports from Thuringia regarding the treatment by veterinary practitioners of 116 cases of dourine with "Bayer 205"; other cases were also treated, but information concerning them is deficient, and even in some of the 116 cases it is not satisfactory.

For purposes of compiling a report the following classification was prearranged:—

1. Cases in which the drug proved from the first to be inactive. This class of case, where an influence on the disease was not to be seen, was not observed, if one does not consider here undoubted or absolute "Bayer 205"-resistant cases.

2. Cases in which the action of "Bayer 205" is only unsatisfactory and notwithstanding sufficiently long treatment does not lead to a cure. Details are given of a case which falls under this head.

3. Cases in which the drug produces powerful reactions which prevent its further employment. This class of case has not been noted.

4. Cases in which the cure is only apparent, and after shorter or longer intervals relapses occur. Details are given of several cases which fall under this head.

From the above it appears that in a number of cases "Bayer 205" is perhaps a failure.

Considering all the facts, the results hitherto obtained in the treatment of the remaining late cases of dourine are to be regarded as especially gratifying.

W. Y.

NAVARRO (Augusto). **Traitement des trypanosomiases expérimentales par les acides arsiniques.**—*C.R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 976–978.

The author has examined the therapeutic and toxic effects of several organic preparations containing arsenic in the pentavalent form.

The most favourable results were obtained with the sodium salt of 3-amino-4-hydroxyphenylarsinic acid (189). Other products examined were sodium acetylaminohydroxyphenylarsinate (190), sodium aminohydroxyphenylarsinate carbamide (*l'urée de l'aminooxyphényl arsinate de soude*) (199), the sodium salt of phenylaceticarsinic acid (187), dimethylaminobenzylarsinic acid hydrochloride (188), the sodium salt of the benzarsinamide of aminophenylacetic acid (201).

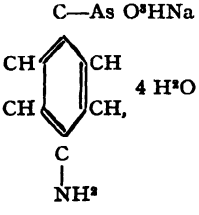
The effect of "189" was determined on *T. brucei* and *T. rhodesiense.* The dose tolerated by mice of 20 gm. varied from 0·030 to 0·035 gm. according to the degree of purity of the drug. [The author means by the dose tolerated that which did not produce nervous symptoms.] The fatal dose is 0·040 gm. It was found that 0·007 gm. injected under the skin always cured mice infected with *T. brucei* and *T. rhodesiense.* The ratio of the curative dose to the dose tolerated is therefore 1 to 5, which is much better than that of atoxyl, in which it is 1 to 2, and that of arsenophenylglycine, where it is 1 to 3.

Product "190" is slightly less toxic than "189," but it is much less active; the other drugs were either very toxic or of little therapeutic value.

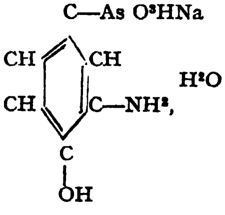
W. Y.

NAVARRO-MARTIN (Augusto). **Sur l'emploi de l'aminophénolarsinate de soude dans le traitement des trypanosomiasis.**—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 38–45.

The author examined the therapeutic value of aminohydroxyphenylarsinate of sodium (189) on mice infected with *T. brucei* and with *T. rhodesiense.* He gives the formula of the drug and, for comparison, that of atoxyl; they are as follows:—



Atoxyl.



Aminohydroxyphénylarsinate de soude.

Experiments showed that aminohydroxyphenylarsinic acid (189) exerts a powerful trypanocidal action: its therapeutic coefficient (curative dose: tolerated dose) is less than 1 : 5. It produces nervous symptoms only when used in doses 5 or 6 times as great as the curative dose. In the form of the monosodium salt (diluted 6 to 13 times) it can be injected subcutaneously without causing trouble.

W. Y.

NAVARRO-MARTIN (A.) & STEFANOPOULO (G. J.). **Action de l'aminophénolarsinate de soude (189) sur les trypanosomiases expérimentales du Cobaye.**—*C.R. Soc. Biol.* 1922. Apr. 1. Vol. 86. No. 13. pp. 702–703.

This paper is a continuation of that summarized above. The therapeutic value of "189" was tested on guinea-pigs infected with nagana and with *T. gambiense*. The animals were treated with doses varying between 0·03 gm. and 0·3 gm. per kilo of body-weight. In the nagana series of animals some were cured by a dose of 0·05 gm., and all with a dose of 0·1 gm. per kilo. For the guinea-pig the therapeutic coefficient (curative dose over the dose tolerated) varies from 1 : 3 to 1 : 6. Very similar results were obtained with the *gambiense* series of animals, in which the therapeutic coefficient varied from 1 : 4 to 1 : 5. The drug is given subcutaneously.

W. Y.

ADLER (S.). **The Trypanocidal Effect of Phenylglycine Amido Arsenate of Sodium on *T. brucei* in Rats and *T. rhodesiense* in Mice.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 427–432.

The conclusions are :—

"Phenylglycine amido arsenate of sodium can be used in freshly prepared solutions in distilled water for intraperitoneal injection into rats and mice ; the solutions on standing become toxic, and later become yellow in colour.

"For rats, the minimum lethal dose of the freshly prepared drug proved to be 1·2 gm. per kilo of body-weight.

"For rats infected with *T. brucei*, the minimum curative dose is 0·7 gm. per kilo of body-weight.

"*In vitro* the drug has no appreciable action on trypanosomes, nor has the blood of treated animals immediately (twenty-four hours) after becoming trypanosome-free.

"The drug has no curative effect on mice infected with *T. rhodesiense*.

"A remarkable feature of this drug is its relatively high minimum lethal dose. Although the drug contains 26 per cent. arsenic, the minimum lethal dose was found to be 1·2 gms. per kilo for rats and 3 gms. for mice."

W. Y.

YAKIMOFF (W. L.) & WASSILEWSKY (W J.). **Expérimentation avec le "Dissodoluargol" de Danysz.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. p. 640.

Dissodoluargol has the advantage over luargol of being soluble in water without the necessity of adding soda. The lethal dose for a mouse of 20 gm. is 1 cc. of a 0·5 per cent. solution, 1 cc. of a 0·4 per cent. solution being tolerated. Therapeutic experiments show that the two drugs are of unequal value. The active dose is the same, *e.g.*, 1 cc. of a 0·11 solution for a mouse of 20 gm.

W. Y.

FROUIN (A.) & GUILLAUMIE (M.). **Action des sels de rhodium, de bismuth, de terres rares et de niobium dans le traitement du nagana chez la souris.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 446–448.

Repeated subcutaneous injections of 0·4 cc. to 1·2 cc. of a 0·5 per cent. solution of the citrate of niobium and sodium had no effect on mice infected with nagana. The subnitrate of bismuth—1 per cent. solution in 10 per cent. mannite—caused the disappearance of the trypanosomes and a prolongation of the life of the animals. The bismuth solution given in conjunction with salts of cerium had much the same effect, as did also combinations of bismuth with the salts of yttrium. Solutions of chloride of rhodium (1 per cent.) given subcutaneously prolonged life for 2 to 10 days, without causing disappearance of trypanosomes, possibly through increasing the resistance of the animals or by neutralizing the toxins of the parasite.

W. Y.

ADLER (S.). **Note on Bismuth as a Trypanocide.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. p. 433.

The effect of bismuth in the form of the soluble bismuth sodium tartrate in solutions of various strengths was tried on mice and guinea-pigs infected with *T. rhodesiense* and *T. brucei* (ferox). In no case was a cure obtained.

W. Y.

KRAUSE (M.). **Trypanocide Wirkung methylierter Fuchsinderivate und gekuppelter Safraninderivate.** [The Trypanocidal Action of Methylated Fuchsin Derivatives and of Coupled Safranin Derivatives.]—*Zeitschr. f. Physikalische u. Diatetische Therap.* 1919. Vol. 33. pp. 231–237.

This chemical paper is of a technical nature and should be consulted in the original by those interested. The author prepared synthetically highly-methylated fuchsin derivatives and tested three of these, which he designated respectively Trypafuchsin 1, 2 and 3, according to the number of methyl groups. The drugs were given *per os* to rats and guinea-pigs infected with *T. gambiense, T. rhodesiense* and *T. congolense*; they can also be given subcutaneously without damage to the animals. It was found that the preparation which contained most methyl groups, viz., Trypafuchsin 3, had the best action.

W. Y.

ALTARA (Iginio). **Auto-antigeno, -emo e -siero terapia nelle tripanosomiasi sperimentali.** [Auto-Antigen, -Haemo and -Serum-Therapy in Experimental Trypanosomiasis.]—*Ann. d'Igiene.* 1921. Nov. Vol. 31. No. 11. pp. 681–687.

In these experiments the author used dogs infected with *T. lanfranchii*. The auto-antigen was prepared by withdrawing blood from an infected dog, defibrinating it, removing the layer immediately above the red cells and, after diluting it with sodium citrate solution, heating at 50° C. for 10 minutes. In the auto-haemotherapy experiments, blood was withdrawn from an infected dog shortly after the first crisis, when no parasites were to be seen in the blood; this was then heated at 50° C. for 10 minutes, and about 10 cc. or 20 cc. reinjected. In the auto-serum therapy experiments blood was withdrawn during a crisis, allowed to clot, and the 25 cc. of the serum obtained injected the following day.

No beneficial results were obtained from these procedures.

W. Y.

NATTAN-LARRIER (L.). **Infections à Trypanosomes et voies de pénétration des virus.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 537–542. With 1 chart.

LAVERAN and MESNIL showed that the severity of infections and the duration of the incubation period in experimental trypanosomiasis varied according to the method of inoculation. The author examined this question in the case of *T. equiperdum* and *Schiz. cruzi* infections in the white mouse and guinea-pig. He found that when *T. equiperdum* was inoculated subcutaneously into mice the incubation period was longer, but the duration of the infection slightly shorter than when it was given intraperitoneally, and that these characters were even more marked when the virus had penetrated the skin or mucous membrane. When *Schiz. cruzi* was inoculated subcutaneously in guinea-pigs, the incubation period was longer than after intraperitoneal inoculation, but there was no alteration in the duration of the infection. When the virus was allowed to penetrate the mucous membranes of the mouse the incubation period was slightly prolonged, but the intensity of the infection was very much lessened.

W. Y.

VAN SACEGHEM (René). **Le pouvoir attachant du** *Trypanosoma congolense-pecorum* **variété** *ruandae*, **pour les hématies.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 203–204.

When fresh coverslip preparations of *T. congolense* var. *ruandae* are examined, it is seen that the great majority of the parasites are attached at their anterior extremity to red cells. Parasites which have been cultivated for 24 hours on Novy medium lose this power. This phenomenon is not observed in the case of trypanosomes exhibiting a rapid translatory movement, *e.g.*, *T. cazalboui*, and the author asks whether the attachment phenomenon exhibited by *T. congolense* is not for the purpose of distributing it rapidly throughout the organism of the host.

W. Y.

BESSEMANS (A.). **Valeur comparative des techniques de préparation de l'antigène destiné à la réaction de Bordet-Gengou pour le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1922. Feb. 4. Vol. 86. No. 5. pp. 289–292.

The author has examined the various methods which have been devised for preparing antigen for use in the complement deviation test for dourine in horses. He found that aqueous or alcoholic extracts of organs of animals which had died from trypanosomiasis have a specific activity too feeble and too unequal to be of real use in the Bordet-Gengou reaction for the diagnosis of dourine in horses. Among the extracts of the blood of animals heavily infected with virulent trypanosomes, two only are good and of practical utility, viz., that of fractional centrifugation (LEVADITI-WATSON) and that of haemolysis by the addition of 0·5 per cent. saponin (MOHLER-REYNOLDS.) The emulsion and the preservation of the deposit are best made in glycerine water. A comparative study of the last two procedures showed that in spite of its great anti-complementary power, the antigen of MOHLER and REYNOLDS is best because it provides a much greater number of doses.

W. Y.

ZANDBERGEN (K.). *Trypanosoma equiperdum* **en lage temperaturen.**—*Tijdschr. v. Vergelijkende Geneesk., enz.* 1922. Apr. 1. Vol. 7. Nos. 2 & 3. pp. 146–148. (French summary, p. 148. English summary, p. 149.)

The following summary is given :—

" In experiments with *Tryp. equiperdum* and low temperatures, I have found, till now, the following results :

" In the ice-box, the above trypanosomes are movable during 5 days and infectious only during 2 days.

" By—20° C. they lose mobility after 2 hours and 10 minutes, but are still infectious after 3 hours.

" By—40° C. they are immobile after 1½ hours, but infectious after 2¼ hours.

" By—145° C. they are still mobile after 35 minutes, after 45 minutes no mobility was to be seen, but, notwithstanding that, the blood was infectious.

" In liquid air (about —190° C.) the trypanosomes lose mobility after 9 minutes, but are still infectious after 25 minutes, after 30 minutes the trypanosomes were dead. The latter result is, as has been proved by later experiments, an exception."

W. Y.

TALIAFERRO (W. H.). **Variation and Inheritance in Size in** *Trypanosoma lewisi.* **i. Life-Cycle in the Rat and a Study of Size and Variation in " Pure Line " Infections. ii. The Effects of Growing " Pure Lines " in Different Vertebrate and Invertebrate Hosts and a Study of Size and Variation in Infections occurring in Nature.**—*Proc. Nat. Acad. Sci.* Washington. 1921. May & June. Vol. 7. Nos. 5 & 6. pp. 138–143. With 2 text-figs.; pp. 163–168.

i. The author writes : " The general plan of the present work on size in *T. lewisi* is to make a careful study of size and variability in a pure line and then, with this background, to attempt to explain the facts observed in infections occurring in nature. After a pure line infection was obtained, the following questions were attacked : (1) What are the mean and the coefficient of variation ? (2) Does growing the same ' pure line ' in different vertebrate hosts cause significant differences in the mean size or in the coefficient of variation ? (3) Does passage of the ' pure line ' through the invertebrate host cause significant differences in the mean or coefficient of variation ? This question gives us a chance to test the possibility that passage of the ' pure line ' through the invertebrate host may cause a splitting up of the ' pure line ' into heritably diverse lines. After a study is made of these questions we can attack the final one : (4) Does an infection occurring in nature consist of a large number of ' pure lines ' such as has been described by Jennings and others in free-living protozoa which differ among themselves but are *per se* constant in size ? "

These questions cannot be approached with any degree of exactness until a thorough study is made of the changes in mean size and variability throughout the course of infection.

The first paper deals with these changes in size and variability and with the first of the questions enumerated above. The conclusions are :—

> "We can draw the following conclusions from this part of the work; *Trypanosoma lewisi* reaches an 'adult' stage in its development in the rat in about 25 days after it appears in the blood. Once this stage is reached there is practically no division or growth. Due to the elimination of growth factors, the organisms show a very low coefficient of variations in 'pure line' infections, provided they are measured after the 'adult' stage is reached. These facts make *T. lewisi* a very favourable organism in which to study size and variation."

ii. In this paper the author endeavours to find answers to the last three questions enumerated above. His conclusions are as follows :—

> "At the present phase of the work the following conclusions may be drawn : While growing the same 'pure line' in different rats may cause significant differences in the mean size, these differences are small The differences in the mean are never greater when the 'pure line' is grown in different species of rats than when it is grown in different individuals of the same species. Passage of the 'pure line' from rat to rat is not followed by any significant changes in the coefficient of variation. In marked contrast to this it is found that passage of the 'pure line' through the flea is invariably followed by a significant increase in the coefficient of variation which is interpreted as showing that the 'pure line' breaks up into heritably diverse lines following such passage. Although passage through the flea has such a marked effect on the variability it has no significant effect on the mean size. 'Wild' infections occurring in nature exhibit differences in their mean sizes which are greater than can be explained by the fact that they occur in different rats. The coefficients of variation of 'wild' infections are, on the average, higher than for the 'pure line.' The lowest of these coefficients, however, is not greater than the coefficient of variation for the 'pure line' and even the highest can be explained on the assumption that the 'wild' infection consists of only a very few 'pure lines.' It seems probable that there occur, in nature as a whole, a large number of 'pure lines' which differ among themselves but are *per se* constant in size, but, due to the peculiar way in which rats receive their infections, a given infection consists of only a very few of these lines. In fact, a large number of 'wild' infections are probably actual 'pure lines.'"

W. Y.

RODHAIN (J.). **Sur la réceptivité des Roussettes épaulières,** *Epomophorus Wahlbergi Haldemani* **(Hallowel) et** *Epomophorus pusillus* **(Peters) aux** *Trypanosoma gambiense* **(Dutton) et** *congolense* **(Broden).**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 246–253.

In a previous note the author, in collaboration with VAN DEN BRANDEN, has shown that the large African bat, *Cynonycteris straminea,* is susceptible to *T. gambiense,* but resistant to *T. cazalboui* and *T. congolense* [this *Bulletin,* Vol. 8, p. 272]. In the present paper are recorded the results of inoculation of two other Congo bats, *Epomophorus wahlbergi haldemani* and *Epomophorus pusillus* with *T. gambiense* and *T. congolense.* Both proved to be susceptible to each trypanosome. *T. congolense* produced in each a fatal infection of an acute type, whereas *T. gambiense* produced an infection of a chronic type.

W. Y.

SERGENT (Edm.) & DONATIEN (A.). **Les stomoxes, propagateurs de la trypanosomiase des dromadaires.**—*C.R. Acad. Sci.* 1922. Feb. 20. Vol. 174. No. 8. pp. 582–584.

Trypanosomiasis in dromedaries in northern Africa is known to be disseminated by several species of tabanids, but recent work has shown that these are not the only vectors The authors have observed among dromedaries in paddocks an epidemic spread solely by stomoxys. The transmission, both by tabanids and stomoxys, is entirely mechanical; no evolution of the trypanosomes was observed in the insects. In order to transmit, the insects must bite an infected animal immediately before biting the healthy one. W. Y.

i. YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **L'identification du trypanosome des chameaux du Turkestan et de l'Oural.**—*Bull. Soc. Path. Exot.* 1921 Dec. 14. Vol. 14. No. 10. pp. 637–638.

ii. ——. **A propos de l'identification du trypanosome des chameaux du Turkestan russe.**—*Ibid.* pp. 638–640.

i. The authors have examined the trypanosomes from camels in Turkestan and have compared them with those from Boukhara in the Urals.

A sheep inoculated in September, 1914, with the Ural strain became infected, but subsequently recovered, subinoculation from its blood the following February and April being negative. The serum of this animal protected mice, not only against the Ural strain, but also against the Turkestan strain, and consequently the authors conclude that the two are identical.

ii. In previous papers the author has shown that the dourine strain from Russia is identical with that from Algeria, and that the trypanosomes from donkeys at Boukhara are identical with those from camels in Turkestan, and finally that the Russian dourine strain is different from the Boukhara and Turkestan strains and from *T. brucei.* In this paper he shows that the trypanosome from Turkestan camels is not identical with the other camel trypanosomes, viz., *T. evansi* and *T. soudanense.* This conclusion is based on the protective action of the serum of immunized sheep. He proposes to give the trypanosome from Turkestan camels the name *T. ninae-kohl-yakimovi.*

W. Y.

VAN SACEGHEM (René). **La trypanosomiase au Ruanda.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 259–262.

The author found at Ruanda two species of pathogenic trypanosomes, viz., *T. cazalboui* and *T. ruandae* (*pecorum, congolense*). *T. ruandae* has no free flagellum and varies in length from 9–16μ, and in breadth from 1·5–2μ or even 3μ. Details are given regarding its pathogenicity and also of attempts at therapy of naturally infected animals. As a result of his work, the author concludes that *T. ruandae* must be regarded as synonymous with *T. congolense* (*pecorum*). Intramuscular injections of tartar emetic caused the trypanosomes to disappear from the blood in 7–10 days, but all attempts at treatment proved unsatisfactory.

Van Saceghem remarks that the existence of hyperleucocytosis in animals infected with *T. ruandae* is a good sign and, on the contrary, that lymphocytosis is an unfavourable sign.

W. Y.

i. VAN SACEGHEM (René). **Sérothérapie des trypanosomiases animales.**—*C.R. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 515–516.
ii. ——. **La sérothérapie dans le traitement des trypanosomiases.**—*Ibid.* May 6. No. 16. p. 981–984.

i. The object of this work was to determine whether the serum of animals infected with trypanosomes—but slightly active against the trypanosomes of the animal in question—could be utilized to cure the infection in another animal. The parasite used in the experiment was that recently described by the author under the name *T. ruandae* [this *Bulletin*, Vol. 17, p. 338].

Five goats were inoculated each with 5 cc. of blood from a heavily infected ox, and in 6–10 days all showed parasites in the circulation. When parasites appeared, three of the goats received 100 cc. of serum from a clinically infected ox, and the injections were repeated each week for five weeks. The trypanosomes did not disappear, but remained scanty in the blood for two months; three months later, the author was able to regard the animals as definitely cured. The two control goats died from the disease.

These experiments permit the conclusion that the serum of infected animals inoculated several times into another infected animal produces a cure.

ii. Indigenous sheep are but slightly susceptible to *T. ruandae* and the infection which results is chronic and ends in recovery; there exists in these animals a protective substance which prevents too great a multiplication of parasites and also prevents the trypanosome from becoming neurophil. Goats, on the other hand, are highly susceptible; the same protective substances are produced in them, but *pari passu* the trypanosomes become immune. As shewn, however, in the previous paper, the usual acute infection in goats can be made chronic by the subcutaneous injection of massive doses (100–200 cc.) of the serum of an animal (ox) which has been suffering for some months with the same infection. It appears, therefore, that great quantities of antibody inoculated into a recently infected animal in which the trypanosomes have not become resistant prevents them from becoming so. An animal cured by serum therapy is immune against reinfection.

W. Y.

FRANCHINI (G.). **Trypanosome de la chauve-souris en Italie. Formes viscérales et stades de développement chez un Acarien Gamaside, le *Leiognathus laverani* n. sp.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 542–546. With 2 text figs.

The author examined 100 bats (*Vesperugo pipistrellus*) caught in a farm situated in a marsh about 40 kilometres from Bologna, and found scanty trypanosomes in 30 of them. The parasite was small and pointed, sometimes angular in stained preparations; the centrosome was spherical and situated near the posterior extremity; the nucleus was oval, rather large, and situated anteriorly; the undulating membrane was narrow and the free portion of the flagellum of a considerable length. The trypanosome measured 8·5–10μ in length, and it had a free flagellum measuring 6–10μ.

In smears of the liver and lungs leishmania forms were found. Multiplication of the parasite does not take place in the peripheral blood. Crithidial forms were not found.

Numerous lice and Acarids were found on the bats and were examined; nothing was discovered in the former, but in the latter belonging to the species *Leiognathus laverani*, crithidia and young trypanosomes were found.

The author writes with reference to the hypothesis of CHATTON and COURRIER regarding the relation between the trypanosome of the bat and epidemic goitre, it should be noted that in the whole of the province of Bologna and Ferrara, epidemic goitre does not exist.

W. Y.

ROSENTHAL (F.) & NOSSEN (H.). **Serologische Trypanosomenstudien. II. Mitteilung. Eine Serodiagnose verschiedner menschlicher Ikterusformen.** [Serological Trypanosome Studies. II. Communication. A Diagnosis of Varying Forms of Icterus in Human Beings.]—*Berlin Klin. Woch.* 1921. Sept. 12. No. 58. No. 37. pp. 1093–1097.

Reference is made to the first communication on this subject by ROSENTHAL and KRÜGER [this *Bulletin*, Vol. 19, p. 154] in which it was shown that the trypanocidal titre of human serum stands in very close relationship with the functional efficiency of the liver, and that in all probability the liver is the place of formation of the trypanocidal substance present in serum.

Details of an experiment are given showing that the trypanocidal properties of the serum had completely disappeared in a case of catarrhal jaundice, but that 14 days later during convalescence they had returned in full amount; another experiment is given showing the same phenomena in a case of jaundice after the administration of salvarsan. Further experiments showed that the phenomenon was not observed in cases of haemolytic jaundice and icterus in pernicious anaemia, but was given by cases of mechanical and catarrhal jaundice. In still another experiment the trypanocidal properties of the serum of a mother and that of a new-born child are examined; the former exhibited the trypanocidal action in normal degree, whilst in the latter it was almost completely absent. The paper should be studied in the original by those interested.

W. Y.

FRANCHINI (G.). **Sur un trypanosome du latex de deux expèces d'Euphorbes.**—*Bull. Soc. Path. Exot.* 1922. Jan 11. Vol. 15. No. 1. pp. 18–23. With 1 text fig.

Trypanosomes were discovered in the latex of two species of Euphorbia, viz., *Euph. nereifolia* and *Euph. coerulescens*. In fixed and stained preparations of the latex it was found that the parasites were of two types; the large forms measured 8–10μ (very rarely 12μ) in length by 1–2μ in breadth, and the small forms 4–8μ in length and 1–1·5μ in breadth. The nucleus was round, very deeply stained, and generally situated in the anterior portion of the body. [In the figures it is depicted posterior to the middle of the body.] The blepharoplast was rod-shaped and lay posterior to the nucleus; the undulating membrane, when it exists, is slightly developed, and there is hardly ever any free flagellum. The parasite is named *T. euphorbiae*.

Franchini examined the various insects found in the vicinity of the Euphorbia with the object of ascertaining, if possible, what was responsible for the transmission of the trypanosomes. In various *Pentatomidae* he found in the gut, salivary glands and proboscis a crithidia; in *Pyrrhocoridae* he found herpetomonas in the coelomic fluid and in the salivary glands and proboscis; in various *Lygoeidae* he found both herpetomonas and crithidia; in *Muscidae* he found herpetomonas and more rarely trypanosoma; in *Culicidae* he found crithidia, herpetomonas, and sometimes trypanosoma, and in *Psychodidae* a few herpetomonas.

W. Y.

MISCELLANEOUS.

FRANÇA (Carlos). **Existe-t-il un criterium pouvant nous guider dans l'application du traitement antirabique.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 428–432.

In 1900 the author noticed that along with other lesions there is in the ganglionic tissue of rabid animals a remarkable local abundance of mast-cells, and that these by their vacuolation and loss of granulations are undergoing degeneration. It appears, therefore, reasonable to conclude that the virus of hydrophobia has some pronounced action on mast-cells.

In healthy adults submitted to antirabic treatment, towards the end of the graduated treatment, after the most virulent cords have been injected, there is a great increase of mast-cells, and increase of uninuclears, and a decrease of "polynuclears," and the percentage of eosinophiles is either normal or increased.

In two cases of untreated hydrophobia the author observed an inversion of the above specified leucocyte formula—the mast-cells and uninuclears were decreased and the "polynuclears" increased, and the percentage of eosinophiles was either normal or diminished.

Again, in a boy who showed symptoms of hydrophobia about the fourth day of antirabic treatment, the percentages of uninuclears and mast-cells were normal, the "polynuclears" were slightly increased, and the eosinophiles diminished.

Comparing these three phenomena, the author concludes that the combined increase of uninuclears and mast-cells, as seen in healthy adults who have received injections of the most virulent cords by graduation from non-virulent cords, indicates a successful posture of defence against the rabic virus; and that the opposite combinations seen in declared hydrophobia indicate failure of defence. If this conclusion be correct, the author argues that the treatment which by experiment brings about the "defensive" leucocyte formula—that is to say, the graduated treatment starting with non-virulent cords—is the rational treatment; also that in cases of severe bites or of delayed treatment the leucocyte formula should be investigated.

A. Alcock.

REMLINGER (P.). **Contribution à l'étude de l'atténuation du virus rabique fixe pour l'homme.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 233–235.

The author has often drawn attention to the profound difference between the virus of the rabies "of the street" and the fixed virus in use at antirabic institutions, and the present paper is an argument for commencing antirabic treatment with virulent cords and increasing the daily dosage, so as to shorten the duration of the course of treatment. In his own practice he now uses only cords dried over potash in an underground room (8°–10° in winter, 24°–26° in summer). His argument is countenanced by an unintentional experiment. By an unfortunate mistake a man bitten by a dog supposed to have been rabid, received, the same day, an emulsion of 2 cm. of what was practically a fresh unmodified cord. The mistake having been discovered he was put under antirabic treatment the next day, and was started on 2 cm. of a six days' cord. The treatment was continued with cords of increasing virulence (five, four and three days) up to a term of fifteen days. The patient is now alive and in perfect health several months after the termination of his course of treatment.

A. A.

UMENO (S.) & DOI (Y.). **A Study on the Antirabic Inoculation of Dogs, and the Results of its Practical Application.**—*Kitasato Arch. Experim. Med.* 1921. Mar. Vol. 4. No. 2. pp. 89–108.

The contents of this interesting paper from the Kitasato Institute for Infectious Diseases, Tokyo, are sufficiently given in the author's summary, which is as follows :—

" 1. In Nippon, rabies prevailed since 1901, and year by year assumed a more and more severe disaster. In 1915 there were 1,424 rabid dogs, while 3,230 persons were bitten in the same year. Figures, however, have not risen to that maximum since, but in Kanagawa and Tokyo Prefectures they have still been increasing, and in 1918 there were 213 rabid dogs and 218 persons bitten in Kanagawa Prefecture alone, and 511 rabid dogs and 682 persons bitten in Tokyo Prefecture, while in the whole country there were 1,072 rabid dogs and 1,340 persons bitten, including the above mentioned figures.

" 2. Thus it had been found that the hitherto applied method of prevention of rabies, which was the killing of rabid dogs and all non-pet dogs, and the confinement of pet dogs, or the use of the muzzles, has proved insufficient to eradicate this dreadful malady. Prophylactic inoculation of healthy dogs, if possible, would, therefore, seem most desirable.

" 3. In the hope of attaining this desired result, the senior author Umeno prepared the antirabic vaccin from the brain and the spinal cord of a rabbit, which had been inoculated with the fixed virus. The preparation of the vaccin from that material was made just after the same method as his calf lymph vaccin is prepared. It is briefly as follows :— The brain, together with the spinal cord, were pounded in a mortar. One part of this pounded material was then mixed with 4–5 parts of phenolized glycerin-water. In order to diminish its virulence, this mixture was stored for a certain period of time either at room temperature or in the ice-chamber. The dose was 6·0 cc. of vaccin per 15 kilogram body weight of the dogs. This quantity of vaccin was injected in two different places. The sizes of the doses should, of course, be governed by the different races, ages, body weights, etc.

" 4. This vaccin was first experimentally used on 500 dogs. No vaccination losses occurred, nor were there any dogs that contracted the disease during the time of observation.

" 5. In Kanagawa Prefecture, the prophylactic vaccination of pet dogs has been practised since October 1918. Until the end of the same year, 6,644 out of 9,402 dogs were vaccinated. In 1919, 9,150 out of the 14,644 registered pet dogs were vaccinated. No vaccination losses occurred, nor were any cases of rabies developed after vaccination. It will thus be seen that in Kanagawa Prefecture, the entire annual number of rabid dogs has been growing less since the introduction of prophylactic inoculation ; for in 1919, during which year vaccination had been practically applied to a great number of dogs, the total annual number of rabid dogs decreased to four-fifths of that of the preceding year, while the number of the persons bitten during the same year decreased to three-fourths of that of the preceding year. All these rabid dogs had not been vaccinated.

" 6. Vaccination of dogs in Tokyo Prefecture was first introduced in May 1919. Until the end of that year 15,513 dogs had been vaccinated, of which one died after vaccination and one contracted hydrophobia. During the same year there were about 20,000 registered pet dogs, of which 13,177 were vaccinated during the seven months from May to December 1919. During the six months from October 1919, to March

1920, there was about one half of the total number of rabid dogs which had appeared during the corresponding six months from October 1918 to March 1919, whilst the total number of persons bitten were also only about one half of that for the corresponding six months one year before. All the rabid dogs, except the above mentioned one case, were non-pet dogs.

"7. By summing up the statistics obtained in Kanagawa and Tokyo Prefectures we obtain the following figures :—There were 31,307 vaccinated dogs, of which number there was only one case of vaccination loss and one in which the vaccination was not to be regarded effective enough. There appeared quite a number of rabid dogs among the non-vaccinated dogs. Thus we see the great importance of the vaccination of dogs in order to prevent the spread of rabies among dogs. The most rational prevention of rabies, therefore, would be the killing of all the non-pet dogs, and on the other hand, to vaccinate all pet dogs with lyssa vaccin. The authors hope that by these measures the total annihilation of the danger from rabies may be effected for the sake of public health of both human society and of domestic animals."

A. G. B.

DE RAADT (O. L. E.). **De Decentralisatie der Hondsdolheidbehandeling in Nederlandsch-Indië.** [The Decentralization in Treatment of Rabies in the Dutch East Indies.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 372–379.

De Raadt criticizes the paper of PONDMAN (this *Bulletin*, Vol. 18, p. 288), and points out that his views are too conservative after the results obtained by SEMPLE, in India (Kasauli). The author thinks that there should not be any hesitation in putting the dead fixed virus in the hands of medical men at the different out-stations and making them administer the whole course of the treatment and not only the commencement as suggested by PONDMAN. The voyage from the other islands to Java might cause a dangerous delay in the continuation of the cure.

W. J. Bais.

COONOOR. **The Pasteur Institute of Southern India, Coonoor. The Annual Report of the Director together with the Fourteenth Annual Report of the Central Committee of the Association for the Period ending 28th February, 1921.** [CORNWALL (J. W.), I.M.S.]—pp. 29. 1921. Madras: Printed by the Superintendent, Government Press. [For official use only.]

In the 12 months under review, 3,623 patients underwent a full course of treatment, the largest number in the Institute's history. Figures are given, covering eight annual periods, which go to show that the real death-rate after treatment is higher than the usual tables show, about 3 per cent., and that antirabic treatment reduces the likelihood of death from hydrophobia by 50 per cent. Another table indicates what proportion of persons bitten by rabid animals may be fatally infected. Of 225 such persons, 118, or 35·5 per cent., died from hydrophobia; that the animals in question were rabid is rendered certain by the fact that one of the persons bitten in each series succumbed to hydrophobia. All rabid dogs are not equally and invariably infective, either because the infective agent is not always present in the saliva or because some strains are less infective than others. In this way some of the failures of antirabic preventive inoculation may be explained. A series of tables give the usual information about the treated cases, and the report closes with the report of the Central Committee of the Institute.

A. G. B.

AUSTRALASIAN MEDICAL CONGRESS. TRANSACTIONS OF THE ELEVENTH SESSION HELD IN BRISBANE, QUEENSLAND, 21ST–28TH AUGUST, 1920. **Tropical Australia Discussion; Report, Sub-Committee; Provisional Resolutions, Executive Committee; Discussion; Resolutions.**—pp. 39–69. With 4 charts.

A full account of the Report of the Sub-Committee on "Tropical Australia" and the discussion thereon was given in the *Medical Journal of Australia* in 1920, and summarized therefrom in this *Bulletin*, Vol. 17, p. 223. The present report includes graphs which were omitted in the 1920 account. A perusal does not discover the omission of anything of significance. It would perhaps have been better to head the report and discussion—Tropical Queensland, for both the sub-committee and the speakers confined their attention to this portion of tropical Australia. It is also worth noting that the physiological factors were studied in persons inhabiting a narrow slip of coast land, whereas statistics and opinions were gathered from a much larger area with an admitted different climate. Further discussion might be clarified by disuse of the term Tropical Queensland in favour of Coastal and Upland Queensland.

A. G. B.

TUCKER (Clif.). **Where is Tropical Australia?** [Correspondence.]—*Med. Jl. Australia.* 1921. July 9. 8th Year. Vol. 2. No. 2. p. 37

BARRETT (James W.). **Tropical Australia.** [Correspondence.]—*Ibid.* July 23. No. 4. p. 73.

Dr. Tucker describes a region in Queensland about 100 miles from the sea and containing 400,000 square miles, *i.e.*, nearly two-thirds of the whole of Queensland, averaging 800 feet in height, possessing a fine winter climate and a tolerable summer climate with cool nights, with a wide variation between wet and dry bulb temperatures, and the corollary of rapid evaporation. It is this wide variation in his opinion that distinguishes a temperate from a tropic zone. This region is becoming slowly populated by a vigorous race, and nothing else is wanted but home comforts for the women in the matter of housing, water and food.

Sir James Barrett assents. He says that for the region described the mean wet bulb temperature is in January below 75° and in July below 60°; the temperature "offers no insuperable difficulty whatsoever to the development of a vigorous white race." He considers that the variation between wet and dry bulb readings is less important than the mean wet bulb reading, which "for people who clothe themselves in a manner suitable to the climate furnishes a tolerably correct index of discomfort."

A. G. B.

BREINL (A.). **Figures and Facts regarding Health and Diseases in Northern Australia influencing its Permanent Settlement by a White Race.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 558–569.

This paper contains nothing of importance that has not been noted in previous work of this author and his Townsville colleagues [see this *Bulletin,* Vol. 15, p. 298, and elsewhere]. It will suffice to cite the conclusions:—

"1. The facts collected and the observations recorded tend to prove that from the point of view of incidence of diseases other than tropical, North Queensland does not differ essentially from Central or South Queensland.

"2. Tropical diseases, with the exception of hookworm infection, are only scarce and easily controlled.

"3. Our investigations into the physiology of the inhabitants of the coastal areas of North Queensland, when compared with those of a temperate climate, have, as far as carried out, only shown a few quantitative but not qualitative changes.

"4. Up to the present the investigations carried out at the Tropical Institute have not brought to light any fact indicating that health and disease [*sic*], as prevailing in North Queensland, should make a permanent settlement by a white race impossible."

A. G. B.

ELLIOTT (C. H.). **The Life Insurance Aspect of Residence in Tropical Australia.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug., 1920.* pp. 317-321.

The author, who is Chief Actuary, Australian Mutual Provident Society, says that it is doubtful whether any life office has yet had sufficient experience of lives in tropical Australia to enable it to say definitely what rate of mortality prevails among such cases, but from such figures as are available there is no need for differential treatment of North Queensland proponents.

A. G. B.

CANTLIE (James). **Life Insurance in the Tropics. Inaugural Address.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 109–116. (Discussion pp. 116–117.)

Sir James Cantlie asks whether residence in the tropics impairs the health of the individual to such an extent as to justify the imposition of an extra premium by insurance companies. Many of these, on information the source of which is difficult to discover, appear to lump together climates of widely different character between the 33rd North and the 30th South parallel as "dangerously warm country." He notes that the white population of our tropical colonies consists chiefly of young men who go out in perfect health, protected by inoculation, with the knowledge how to avoid disease, and well housed, and that when they go sick they are well looked after or sent home Malaria he regards as the enemy of the employer rather than of the insurance company for it rarely kills, and owing to increased knowledge its danger is much less than formerly. The only other disease of importance in his opinion is dysentery, the death-rate from which has been greatly lessened by the practice of emetine treatment.

The first two or three years of tropical life are the most dangerous to the young European. He should not go out before 21, and the better age is 23 or 25. The present practice is for the insurance company to charge an extra premium when the young man who is already insured goes to the tropics, with the frequent result that the policy is allowed to lapse. Sir James' suggestion is that for the first five years the company shall reduce its liability, to be restored either at once or by stages when the dangerous period is passed, but it appears that this proposal is unacceptable to the companies. Among insurance anomalies he mentions that of patients sent to a warm climate for their health being charged an extra premium, and that of old tropical residents, who having found they cannot keep their health at home and having returned to a warm climate, are penalized by their insurance company for trying to prolong their lives.

A. G. B.

ROGERS (Leonard). **President's Address.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.) 1921. June. Vol. 14. No. 8. pp. 28–31.

The greater part of this address seems to have been devoted to advocating the local study of tropical medicine in the tropical dominions. After referring at some length to the new School of Tropical Medicine in Calcutta and mentioning the other recent advances made in India, the speaker extolled the policy of the Liverpool School of Tropical Medicine in establishing laboratories of their own in West Africa and Brazil. He desired that, with the support of the City of London, the London School should follow the Liverpool lead ; or that, with the support of the Colonial Office, laboratories should be extemporized at the large hospitals in the tropical colonies, where subsidized workers should be sent, for terms of not less than five years, to study the local problems afforded for investigation. The sensational policy of despatching occasional costly expeditions to investigate sudden epidemics, and other such unusual phenomena, he considered to be now somewhat out of date, having served its purpose.

A. A.

JOHNSON (W. B.). **The Weanling in Upper Egypt.** [Correspondence.] —*Lancet.* 1921. Aug. 20. pp. 416–417.

[N.B.—The heading of this letter is misleading. The argument is the supposed relation between the nature of the diet and the incidence of gastric ulcer, appendicitis, and carcinoma.]

Referring to a letter by Nickells DUNN in the *Lancet* of 28th May, where it is suggested that the reason why gastric ulcer, appendicitis and cancer (either of stomach or of breast) are almost unknown among the poor-class rustic Arabs of Upper Egypt may be that these Arabs, going straight from the breast to a diet of coarse bread and *raw* fruit and vegetables, have wonderfully good teeth and powerful jaws, and therefore know nothing of dental caries, the present author suggests that the coarse, bulky vegetable diet may act in quite another way than by influencing the state of the teeth. He states that among the natives of Northern Nigeria, where also gastric ulcer, appendicitis and carcinoma are almost unknown, and the children go straight from the breast to a coarse, bulky, mainly vegetable diet, pyorrhoea and dental caries are not at all uncommon (possibly because these Nigerians *cook* their food). The circumstance common to these two classes of Africans being the bulky vegetable diet (and not the condition of the teeth), the present author hazards the suggestion that this sort of diet keeps the bowels in healthy movement preventive of intestinal stasis, and that this may explain the absence of gastric ulcer, appendicitis and cancer.

So far as Northern Nigeria goes, the author's argument is based on the observation that the natives relieve the bowel two or three times daily and never suffer themselves to get constipated; and on the following interesting statistics:—

Of 400 Northern Nigerian convicts examined, 79·2 per cent. had pyorrhoea and 20 per cent. had dental caries.

In 750 surgical operations there was not one case of gastric ulcer (nor in nine years' work has gastric ulcer ever been observed *post mortem*); of appendicitis and appendicular abscess there were only four cases—two of these being in coast natives; of sarcoma only three cases (one in a coast native); of endothelioma and odontoma five cases—one being in a coast native; and of carcinoma not a single case. On the other hand there were 42 cases of benign tumours.

A. A.

HINGSTON (R. W. G.). **Physiological Changes at High Altitudes and their Relation to Mountain-Sickness.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 173–190.

In the course of a survey expedition to the Pamirs the author investigated the phenomena of "mountain sickness," and made many observations of the blood of different people; and he comes to the conclusion that adaptation to great altitudes is accomplished through the red blood corpuscles which gradually increase in number with the progress of the ascent, and gradually return to the classical normal in the course of the descent and for some time after the return to low level. As an illustration the two following tables, each recording observations on one individual, may be compared:—

Date.	Altitude.	Corpuscles per cu. mm.
April 10th	700 feet.	4,480,000
May 12th	4,390 ,,	5,240,000
May 21st	8,000 ,,	6,040,000
May 28th	10,000 ,,	6,624,000
May 30th	11,960 ,,	6,760,000
June 1st	12,400 ,,	6,800,000
June 21st	13,300 ,,	7,525,000
June 23rd	15,600 ,,	7,840,000
June 26th	16,907 ,,	7,640,000
July 27th	18,203 ,,	8,320,000

Date.	Altitude.	Corpuscles per cu. mm.
August 10th	13,500 feet.	7,402,000
August 20th	9,450 ,,	7,360,000
August 23rd	8,500 ,,	6,960,000
August 28th	8,000 ,,	6,120,000
September 6th	4,390 ,,	5,680,000
October 20th	500 ,,	5,820,000

"Mountain-sickness" occurs if the increase of red blood cells is retarded unduly.

The author's argument is confirmed by his observations of the nomad inhabitants of the Pamirs—the Sarikolis and Kirghiz, who live permanently at an altitude of about 13,000 feet. He found that their one peculiar feature is the richness of the blood, the mean number of red cells per cubic millimetre for seven Sarikolis being 7,596,000, and for certain Kirghiz, 7,920,000. A very interesting paper.

A. A.

JOURNAL OF TROPICAL MEDICINE AND HYGIENE. 1921. Dec. 1. Vol. 24. No. 23. pp. 306–309. [Leader.]—**Address of the Chairman, Professor A. Alcock, C.I.E., F.R.S., at the Annual Dinner of the London School of Tropical Medicine.**

Those who were present at the dinner of the London School of Tropical Medicine in October last, and many others who are readers of this *Bulletin,* will be glad to have a printed record of Col. Alcock's speech in proposing the toast of the School. More need not here be said.

A. G. B.

SODRÉ (Alcindo). **Campos do Jordão. Impressões medicas de viagem.** —*Brazil Medico.* 1921. Oct. 8. Year 35. Vol. 2. No. 13. pp. 177–179.

An account of a visit to the health station of Campos do Jordão on the Serra da Mantiqueira, a range of hills bordering the route from Rio de Janeiro to S. Paulo. The place is being developed with energy as a health resort. It is fairly easily accessible from both Rio and S. Paulo, and would appear to possess many amenities both of scenery and of climate. The altitude is a little over 5,000 feet, the air is dry and bracing, and the difference between the day and night temperatures is comparatively slight and the fall gradual. The average number of hours of sunshine per diem in winter is nearly double that of Davos. The climate has a uniformly favourable influence on metabolism, and, besides tuberculosis in all its forms, great benefit is derived in cases of diabetes, syphilis, rheumatism, respiratory and cardiac diseases, anaemias, gastric and intestinal complaints and neuroses. There is an English pension and a sanatorium for tuberculous patients.

F. S. Arnold.

THE ROCKEFELLER FOUNDATION. **Annual Report for 1920.**—xi+387 pp. With 103 figs. [1921.] New York: The Rockefeller Foundation, 61, Broadway.

Besides the reports of the Secretary and Treasurer, this report contains the President's review for the year, and the respective reports of the International Health Board, of the China Medical Board, and of the Director of the Division of Medical Education.

The outstanding feature of the China report has already been noticed in this *Bulletin* (Vol. 18, pp. 146–147), and the main items of the report on medical education are alluded to in the President's review which, along with the Report of the International Health Board, is here briefly summarized.

PRESIDENT'S REVIEW.

The President's review, full of wise aphorisms, reveals the inward and spiritual grace, as clearly as it describes for the year 1920 the outward and visible doings, of this beneficent organization.

The spirit is also dispassionately formulated in the following words :—

> " Science knows no national boundaries. It is a world product, a common fund of knowledge to which all nations contribute and upon which each may freely draw. To keep open the channels of communication by personal migration and by printed page, to encourage the training of specialists, to foster the growth of institutions, to stimulate research, to encourage the application of scientific knowledge to the needs of nations, communities, and individuals, are tasks upon the successful performance of which largely depends the progress of the world in economic efficiency, physical health, and international goodwill. It is the aim of the Rockefeller Foundation to have a part in this great movement by helping to increase the common store of knowledge about the causes of disease, and through demonstrations and the services of trained experts to diffuse this information as widely as possible among all peoples. Thus does the Foundation seek to fulfil its chartered purpose 'to promote the well-being of mankind throughout the world.' "

The benefactions for the year are thus summarized :—

> " During the year 1920 the Rockefeller Foundation (1) aided six medical schools in Canada, (2) gave a large sum to a medical training centre in London, (3) appropriated a million francs for the Queen Elizabeth Foundation for Medical Research in Belgium, (4) agreed to contribute toward the complete rebuilding of the medical school of the University of Brussels, (5) provided American and English medical journals or laboratory supplies for 11 medical schools and medical libraries in five European countries, (6) continued to construct and to maintain in Peking, China, a modern, medical school with a pre-medical department, (7) aided 31 hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses, (8) supported the School of Hygiene and Public Health of the Johns Hopkins University, (9) contributed to the teaching of hygiene in the medical school at São Paulo, Brazil, (10) provided fellowships in public health and medical education for 90 individuals, who represented 13 different countries, (11) brought to the United States commissions of medical teachers and hygienists from England, Belgium, and Czechoslovakia, (12) continued to support a campaign against yellow fever in South and Central America and in West Africa, (13) aided government agencies in the control of malaria in ten states of the South, (14) prosecuted hookworm work in nine southern states and in 18 foreign countries, (15) helped to expand anti-hookworm campaigns into more general health organizations in counties, states, and nations, (16) brought a war-time anti-tuberculosis work in France to the point where it could soon be left entirely in French hands, (17) assisted the government of Czechoslovakia to reorganize its public health laboratory system, (18) rendered various services in organizing committees to study the training of nurses and of hospital superintendents, lent experts for conference and counsel, sent officers abroad to study conditions, etc., (19) brought to a close its participation in war-time emergency relief by giving a million dollars to the fund for European children. These things were done in part by the Foundation, but chiefly through its departmental agencies—the International Health Board, the China Medical Board, and the Division of Medical Education."

The total expenditure for the year was over seven million dollars, of which nearly four and a half million was allotted to medical education, and something over two million to public health.

The programme for 1921 includes continued aid to medical education and to educational institutions in medicine and public health ; continuation and extension of campaigns against yellow fever, malaria, and hookworm disease, and the development of a public health laboratory service ; aids to surveys and research in dispensary organization, hospital administration, and management of the insane and mentally deficient; and contributions to bibliographical and secretarial organizations of appropriate kinds.

Among other things the review includes an appreciation of General GORGAS.

INTERNATIONAL HEALTH BOARD.

The facts of the interesting report of the General Director of the International Health Board for 1920 illustrate the old text that prevention is better than cure.

It is stated in the summary that the Board's anti-tuberculosis crusade in France was carried almost to the point at which it could be resigned officially to the Government; that the campaign against yellow fever was continued in Central and Southern America, brought to a successful conclusion in Guayaquil and Ecuador, and prospected in West Africa; that anti-malaria-mosquito operations were supported in ten Northern States, and projected elsewhere with a view to their general extension to the tropics; that the war against hookworm was very widely prosecuted; that several local governments, including Czechoslovakia, were assisted in various ways in maintaining a public health service; that the schools of hygiene at Prague and São Paulo were aided; and that much material assistance was given elsewhere in furtherance of education in public health.

The anti-tuberculosis operations in France included aid to dispensaries, provision of beds in hospitals, training of nurses, and extensive and varied educational enterprises. The short courses for doctors were successful beyond expectation.

The extermination of *Stegomyia fasciata*, of course, was the principal object of the measures against yellow fever, but the Noguchi protective serum was also distributed in certain places.

The preliminary proceedings against malaria and mosquitoes were hopeful. The measures employed in towns were simple drainage and levelling, channelling streams, clearing and cleaning streams and ponds, letting in sunlight, oiling, and the use of the top-minnow. In rural areas oil and top-minnows were most in use, the latter in some places proving extremely effective. A promising experiment was made with quinine in a selected area of 100 square miles having a population of 9,000; all persons ascertained to be infected with parasites, or having an authentic history of recent attack, received an annual free treatment of ten grains of quinine daily for a term of eight weeks, and it is estimated that as a result the malaria incidence was reduced from 40 per cent. in 1917 to 18 per cent. in 1920, at a *per capita* cost of 1·08 dollars in 1918, 1·09 dollars in 1919, and 0·38 dollars in 1920.

The imposing hookworm campaign, justifiable *per se* and particularly impressive as an object lesson, was continued in nine Southern States of the Union and in 25 foreign countries, and was prospected in 16 other foreign countries.

As regards assistance to education in hygiene, the Board adopts the principle that the main road to public health lies in the practical training of men in the fundamental sciences and in methods of administration.

The very full appendices to the report deal with hookworm disease in many aspects and hookworm control, operations against yellow fever, and the work of county health departments.

The financial statement for the year accounts for an expenditure of 1,658,269 dollars on all the various activities of this munificent Board.

A. A.

REVIEWS AND NOTICES.

The Practice of Medicine in the Tropics. By Many Authorities. Volume 2. Edited by BYAM (W.) [O.B.E.; Lieut-Colonel, Royal Army Medical Corps (retired); etc.] and ARCHIBALD (R. G.) [D.S.O., M.D.Edin.; Major, Royal Army Medical Corps (retired); Director of the Wellcome Tropical Research Laboratories, Sudan Government, Gordon College, Khartoum; etc.].—xx + 857–1682 and index. Figs. 335–577; plates 36–66 and 1 map. 1922. London: Oxford Medical Publications. Henry Frowde and Hodder & Stoughton. [Price £4 4*s*.]

Section VII. Differential Diagnosis (pp. 857–950): *Section VIII. Bacterial Diseases* (pp. 951–1210).

The first volume of this important book was reviewed in the *Tropical Diseases Bulletin*, Vol. 19, p. 259. It reached such a high standard of merit that the appetite was whetted for more, and one turns to the second volume with a favourable prejudice and an agreeable anticipation. With this part of the work the clinical descriptions of the diseases of the tropics begin. Sections VII and VIII deal with Differential Diagnosis and Bacterial Diseases. All the authors are recognized authorities on the subjects upon which they write; this is tantamount to saying that their accounts of the different diseases bear the stamp of practical experience, and there can be no doubt that this book will be, for many years to come, an authoritative guide to the medical practitioner in the tropics.

The title adopted for the book has obviated the difficulty of deciding what to include in it, since almost all the diseases met with in temperate climates occur also in the tropics. But practical considerations limit the contents to descriptions of those diseases which are especially prevalent in warm climates, and to those modifications of type which the cosmopolitan diseases are apt to undergo, in the tropics, especially when they attack the indigenous inhabitants.

Few men are so favourably situated that they can be specialists in hot countries. In these parts of the world, where, as a rule, doctors are few in number in proportion to the general population, and often isolated from their medical colleagues, men learn to be more practical and self-reliant than it is necessary to be in civilized countries in the temperate zones. The competent tropical physician turns his hand to many things, and requires considerably more than a general knowledge of bacteriology, pathology, protozoology and kindred subjects. The comparatively few laboratories that exist are almost confined to the larger towns, and it is not always possible to send pathological material to experts for examination. These reflections are suggested by a consideration of the contents of these Sections. In almost all the articles much more space is allotted to bacteriology than one is accustomed to see in a work on the Practice of Medicine. In some cases, indeed, the clinical descriptions seem rather brief in comparison. But, for the reasons given above, I think that the editors have done well in giving too much bacteriology rather than too little.

As is befitting, the chapters on Differential Diagnosis are contributed by the senior editor. This, which is one of the most important subjects dealt with, is also that which presents the greatest difficulties to the physician who has not had much experience of tropical diseases. The account given of the several lines of investigation to be followed in a case of "fever" is very full and complete, and will be carefully read and re-read, though a good many of the conditions described have no special connexion with the tropics. Chapter XLI, on Chronic Conditions of Ill-health, met with in the tropics, is very helpful. The author insists very rightly on the fact (which, however, is often ignored) that tropical infections are more often multiple than single, and on the necessity of a routine systematic examination, no matter what the symptoms may be. This is no mere counsel of perfection, but a simple statement of a plain duty.

Again, stress is laid on the importance of bearing in mind the frequency of amoebic liver abscess in all cases of "general debility" in patients from the tropics. This may seem to be an obvious truism, but it is one, also, that is frequently overlooked.

The whole of this chapter is full of useful hints, and there is a sufficient description of such laboratory procedures as blood cultures, estimation of the functional activity of the pancreas, and so on, to enable the general practitioner to appraise their value, and to collect, in a suitable way, material for submission to a laboratory.

There are some brief, but wise, remarks on the necessity of considering the psychology of patients invalided home from the tropics. This can scarcely be understood except by those who have had personal experience of hot countries, where the general conditions of life, its duties, responsibilities and anxieties are so different to those of temperate climates.

I cannot refrain from entering a protest against the use of that common expression, the "acute abdomen," sanctioned though it seems to be by high authority. Surely the abdomen is not acute, though its condition may be. In a work which extends to several thousand pages, this colloquialism cannot be justified even on the grounds of brevity.

The introduction to the section on Bacterial Diseases, contributed by Dr. Carl H. **Browning**, consists of a brief statement of the principles of such subjects as infection, immunity, serological diagnosis and anaphylaxis.

Chapter XLIII, by Colonels D. **Harvey** and J. H. Tull **Walsh**, gives an interesting account of the Enteric Fevers, but without much reference to the modifications of clinical conditions seen in the tropics. There are too, only scanty allusions to the diseases as they occur in native races. The section on diagnosis is almost entirely confined to laboratory methods, which suggests that, in the opinion of the authors, these are the only ones worth consideration. No one would question the truth of the statement that the bacteriologist has the final word in the diagnosis of enteric (though even he is not quite infallible). Actually, however, it is not every practitioner in the tropics who has a laboratory at his own disposal. More often material has to be sent away to a distance to be examined by others, and a report cannot be expected for several days. In the meanwhile the medical attendant has to diagnose and treat his case. In the reviewer's opinion, some of the bacteriology might have been omitted, and the space so saved devoted to clinical diagnosis.

There must be few parts of the tropical world where the statement that epidemics of enteric are to be expected in large fairs and pilgrim gatherings holds good.

Sir P. W. **Bassett-Smith** has written the chapter on Undulant Fever. This gives a very thorough account of its bacteriology, pathology and clinical symptoms, and is illustrated by a number of most instructive temperature charts. The whole article is very full and vividly descriptive of the disease.

The chapters on Plague are shared by Dr. Victor G. **Heiser** and Dr. **Wu Lien Teh** (G. L. **Tuck**), the former writing on bubonic and the latter on pneumonic plague. Both articles are excellent. Though necessarily rather brief, nothing of importance has been left out, and they may be regarded as examples of judicious condensation such as is possible only for those who are thoroughly acquainted with their subject and possess that rather rare mental asset, a fine sense of relative proportion.

The subject of Cerebrospinal Fever is in the hands of Dr. J. Alison **Glover** and Mr. E. G. D. **Murray**. There is a very good account of the bacteriology and pathology of the disease, but the clinical part is rather meagre and describes cerebrospinal fever as it occurs in temperate climates and in the white races.

The chapter by Sir W. BUCHANAN refers to the epidemiology of cerebro-spinal fever in Indian jails. The facts and statistics given are of high interest.

Sir Leonard ROGERS has managed to compress into twenty pages an admirable article on Asiatic Cholera. The section on treatment is particularly good; this is to be expected from the accomplished author who has himself elaborated on logical lines the modern treatment of the disease.

Dr. P. H. MANSON-BAHR and Major H. Marrian PERRY, in collaboration with the late Sir Patrick MANSON, are the authors of the chapter on Bacillary Dysentery. This is certainly one of the best articles in this part of the book. There is a very complete account of the bacteriology, in which is incorporated a great deal of the experience gained in different countries during the war. The section on the morbid anatomy is the best that the reviewer has seen, and that on diagnosis is very good. The illustrations by Dr. MANSON-BAHR deserve unstinted admiration.

Dr. G. W. McCOY has given a masterly account of Leprosy. It is very interesting and explicit, but not at all dogmatic. The section on prognosis is clear and judicial in tone, and there is an able and impartial summary of the various forms of treatment in use.

The article on Tuberculosis in the Tropics, by Dr. G. E. BUSHNELL, discusses the various types of tuberculosis which occur among the different races in the tropics, and a useful comparison is made between the different climates recommended for tuberculous patients.

The frontispiece to this volume is a fine portrait of the late Professor A. LAVERAN.

The reviewer has read these Sections with great pleasure and great profit to himself. It can be thoroughly recommended to all who wish to know the actual state of our knowledge of the different diseases included in its scope. Where there is so much to admire it may seem rather ungracious to point out what are, after all, rather minor blemishes. The chief one of these is that some of the articles appear to refer more to tropical diseases as seen in the white races in the tropics than as they occur among the native populations. Yet it is the latter who constitute the majority of the patients of most doctors who practise in hot countries. It is also rather disappointing to find that most of the articles ignore the practical difficulties of tropical practice among races with strong dietary and caste prejudices, and of general treatment where trained nurses are so often not available.

The paper, type and illustrations are of the high quality that one is accustomed to expect in the Oxford Medical Publications; but the binding is not worthy of such an excellent book (and of one, moreover, which is so expensive), if the copy sent for review can be taken as a fair sample. This arrived with the covers badly warped and blistered. The book also is too heavy; it weighs about six pounds. Its bulk and weight make it very uncomfortable to read even in England. What will it be like in the tropics? It certainly is not a book for a tired doctor to read in a "long chair." I think that this work would be more popular and useful, if the volumes were halved in bulk and their number doubled.

H. J. Walton.

Section IX. Spirochaetal Diseases (pp. 1211–1334): *Section X. Protozoal Diseases* (1335–1682).

Sections IX and X are devoted to the consideration of Spirochaetal and Protozoal Diseases respectively. As in earlier sections of this work the matter is presented in an interesting and attractive manner, and, generally speaking, contains all the information a medical practitioner in the tropics is likely to require about the subjects dealt with. There are many illustrations and numerous coloured plates, some of which are of a high degree of excellence. The last remark is particularly true of the plates illustrating the lesions of amoebic dysentery, which appear to be as near perfection as is possible; while those depicting the parasites of malaria leave little to be desired. Some of the plates, however, are hardly worthy of their place. Plate XXXVI, Fig. 2, shows the blood in relapsing fever, but it is evident that the drawing has been made from a film stained with bad Leishman stain. The same remark applies to Fig. 2 in Plate XXXVII, where it is clear that the nuclei of the leucocytes have not even taken the stain properly. The two figures on Plate XLIX illustrating the stool in bacillary and amoebic dysentery are not sufficiently characteristic if they are intended to represent the typical appearances of the stool in those diseases, while the amoebae figured in Plate LI are crude. Apart from those failings the plates as a whole are excellent.

As regards the text the arrangement of the matter is clear and concise, particularly in the case of those diseases which have been dealt with in single chapters, but in the case of malaria one cannot help feeling that a multiplicity of authors has led to some confusion and needless repetition.

It is evident that the book is in every sense a practice of medicine, and not a book of reference, but it has undoubtedly suffered to some extent by delay in production, as some of the more important recent additions to our knowledge have been treated in a summary manner or omitted entirely. But the reader need not fear that he will miss anything essential to the handling of his cases.

The Spirochaete section includes chapters on infectious jaundice, yellow fever, relapsing fever, syphilis, yaws, bronchial spirochaetosis and rat-bite fever. As an introduction to the spirochaetal diseases, Major R. G. ARCHIBALD has written a chapter on the Spirochaetes as a whole. These organisms are correctly described and are rightly regarded as more nearly related to the bacteria than to the protozoa, though the statement that they multiply by longitudinal as well as transverse division is open to serious question. Too much is taken for granted as regards the granule phase, the existence of which is disputed by many competent observers, while it is difficult to realize why such a granule phase (rather than a spirochaete itself) "clinically would suffice to explain the causation of relapses in spirochaetal diseases."

The writer of this section has confused the issue regarding the nomenclature. It was in 1838 and not in 1834 that EHRENBERG created the genus *Spirochaeta*, and it was the name *Spironema* and not *Treponema* which KLEBS used for a flagellate, and this in the year 1893 and not 1902.

The opening sentence to this section implies that the spirochaetal diseases are of interest at home to systematists alone, but practically all the spirochaetal diseases discussed occur in temperate as well as tropical climates, and some of them are actually less common in the tropics, so that the researches on the spirochaetes have surely proved of interest to clinicians as well.

As was to be expected, Dr. Hideyo NOGUCHI has presented a clear and trustworthy picture of what is known of Infectious Jaundice and its causative organism, *Leptospira icterohaemorrhagiae*.

The article on Yellow Fever, which the author, Assistant Surgeon-General H. R. CARTER, states was written over two years ago, contains a good account of yellow fever from every point of view up to the time of NOGUCHI's first announcement of the discovery of a Leptospira in this disease The subsequent work of NOGUCHI and KLIGLER is referred to in an addendum. Their conclusions appear to the author to be unquestionable, and he has no hesitation in regarding NOGUCHI's organism as the cause of yellow fever. No mention, however, is made of STIMSON's discovery (1907) of what appears to be the same parasite in the kidney of a case of yellow fever, which he named *Spirochaeta interrogans*. In the addendum a brief mention is made of NOGUCHI's curative serum and protective vaccine.

In the chapter devoted to Relapsing Fever, which is written by Professor J. L. TODD, we find that the author has adopted the rational view that all the types of the disease, whether transmitted by lice or ticks, are due to the one organism, *Spironema recurrentis*, and that the various supposed species are merely variations of this one form. The method of transmission by the tick, *Ornithodorus moubata*, is described in detail, but NICOLLE's careful experiments with lice would seem to merit more attention. Apart from *Ornithodorus moubata* and pediculi, various other vectors are mentioned, but some of these have not been experimentally proved to convey the disease. Thus, *Argas persicus* and *Ornithodorus tholozani* are both accused of transmitting the disease in Persia, but actual proof of this is still lacking. Similarly *Ornithodorus turicata* is only a suspect in Colombia. On the question of the granule phase the author is less dogmatic than the writer of an earlier section, though it is evident he believes the granule to play a part in the developmental cycle. The statement that encysted forms occur in the tick evidently does not mean that actual cysts are formed.

The symptomatology, diagnosis and treatment are well described, but it would seem that more emphasis could have been given to that type of the disease which may give rise to suspicions of infectious jaundice or yellow fever.

The article on Syphilis by Dr. W. FLETCHER seems to contain all the information necessary to a worker in the tropics. From the point of view of differential diagnosis, however, no mention is made of the possibility of confusion with ulcus tropicum or the South American espundia.

In an addendum at the end of this volume the details of the Sachs-Georgi reaction and Dreyer and Ward's modification of it, known as the Sigma reaction, are carefully described.

Yaws has been dealt with by Dr. A. CASTELLANI and the late Dr. A. J. CHALMERS in a clear and concise manner. Attention may be drawn to the beautifully executed colour plates illustrating the lesions.

The condition known as Bronchial Spirochaetosis is definitely raised to the rank of a disease in an article by Major R. G. ARCHIBALD. The wisdom of this procedure is open to question, for it is far from being established that any such disease exists, though the presence of numerous spirochaetes in the expectoration of various lung conditions is a well-recognized fact. That these spirochaetes are in any way primarily responsible for the condition, or that the particular species, here referred to as *S. bronchialis*, actually occurs, has never been demonstrated. The spirochaetes in the expectoration are probably saprophytic organisms which have invaded the bronchi from the mouth. FANTHAM's description of *S. bronchialis* has not been confirmed, and the statement that the organism possesses a crista is more than doubtful, as such a structure is present in no known spirochaetes apart from the large Cristispira which occurs in oysters.

At the hands of Dr. C. C. BASS Rat-Bite Fever receives all the attention it deserves. It is doubtful if the Streptothrix isolated by SCHOTTMULLER is now regarded by any one as the cause of the disease; this is generally admitted to be due to *Spirochaeta morsus muris* (not *murium*), which receives due attention.

Protozoal diseases are dealt with in Section X. This includes an introductory chapter followed by others on amoebiasis, the amoebae of the human intestine, trypanosomiases, leishmaniasis, intestinal flagellates, coccidiosis, malaria (ten chapters), balantidiasis. Reviewing these generally they are undoubtedly good and up to date, and medical men will find all the information they require.

In the Introduction Mr. Clifford DOBELL defines the position of the protozoa in the animal kingdom and discusses the important question of the relationship of a parasite to its host.

The chapter on Amoebiasis by Mr. Clifford DOBELL and Dr. G. C. LOW and the one on the Amoebae by the first of these authors leave nothing to be desired, and with them as a guide there should be no difficulty in understanding and dealing with all the pathological conditions arising from amoebic infections. The excellent illustrations have already been mentioned.

Trypanosomiasis has been dealt with by Professors B. BLACKLOCK and Warrington YORKE in a thoroughly useful and rational manner, in three sections devoted respectively to the African trypanosome of man, the South American trypanosome of man and the trypanosomes of domestic animals. All the important facts connected with the disease are included and, though the section devoted to the actual treatment seems short for a book of this title in comparison with the other matter dealt with, it describes all essentials. The numerous species of trypanosome have been reduced to a small number, of which the others are regarded as races or varieties. The proved tsetse-fly carriers of the various trypanosomes are arranged in a useful table. In the case of *Glossina morsitans* the dates attached to *T. congolense*, *T. ignotum* and *T. simiae* should be 1912 and not 1913, whilst KLEINE and FISCHER's transmission of *T. gambiense* by this fly was noted by them in 1912. The reviewer can find no reference to the successful transmission of *T. gambiense* by *G. morsitans* by the Royal Society's Commission before 1915.

The difficult subject of the reservoir host of *T. gambiense* and *T. rhodesiense* is considered, but it seems that the actual position has not been quite clearly stated. As regards the former, DUKE's discovery of what he regarded as *T. gambiense* in the sitatunga in 1912 is referred to, but his later discovery (1921), which possibly appeared too late for inclusion, of trypanosomes of the *T. brucei* type in these animals in the same region of Victoria Nyanza is not mentioned. DUKE's conclusion is that the trypanosome of the *T. gambiense* type originally present in the sitatunga (1912) has now reverted to the *T. brucei* type (1921). It must be recognized, however, that in the earlier work the trypanosome was not studied in small animals such as the guinea-pig, whereas in the later work it was, and it was chiefly on account of the appearance of posterior nuclear forms in guinea-pigs that the trypanosome was recognized as of the *T. brucei* type. It is possible that if guinea-pigs had been used in the early work these forms would have appeared. In any case the absolute diagnosis of *T. gambiense* is exceedingly difficult, and it is clear that many of the claims that have been made as to *T. gambiense* occurring naturally in animals are little more than guesses. This being so, the bald statement that *T. gambiense* has been found in the animals mentioned on pages 1410 to 1414 requires some qualification. Thus, the statement that DUKE found *T. gambiense* in a buffalo and a hyaena in West Uganda is not quite correct. He found a trypanosome resembling it, but was careful to state that an absolute diagnosis could not be made. SIMPSON (1918) is quoted as having found *T. gambiense* in an ox on the Gold Coast. Surely this observation was in a reed buck?

As regards *T. rhodesiense*, though the authors appear to adopt the view of its identity with *T. brucei*, they nevertheless refer to the widespread infection of game with *T. rhodesiense*. There is no known means of distinguishing these. trypanosomes, so it is evident that those found by them in game might equally well be named *T. brucei*. On the other hand, KLEINE, TAUTE, and others believe that *T. rhodesiense*, though morphologically identical, is nevertheless a species distinct from *T. brucei*; and if this is so it is evident that the trypanosome in the game might be either of these. The German observers regard all the game trypanosomes of this type as *T. brucei*, and consider that KINGHORN and YORKE's statement that *T. rhodesiense* occurs in game is incorrect. They further believe that no actual animal reservoir for *T. rhodesiense* has been found.

The human trypanosome of South America is placed in a separate genus, *Schizotrypanum*, but it should be remembered that reproduction by schizogony, which was at first supposed to be the method of reproduction of this trypanosome, and led to the creation of this genus, is now known not to be its normal method.

Kala Azar and Cutaneous Leishmaniasis are dealt with by Major R. G. ARCHIBALD, who has presented a clear and accurate picture of our knowledge of all aspects of these diseases. It is possible that more details of the method of administration of tartar emetic intravenously and the dangers and contra-indications might have been given with advantage. A small error occurs on p. 1459, where Werner is spelt Wemer. No mention is made of the emetine treatment of Oriental sore, which has given some striking results, while it is a pity that the serious South American condition espundia, is not illustrated by any figure. The statement that it was the probability of the existence of a flagellate stage in insects that led Ross to assign the parasite of kala azar to a new genus, *Leishmania*, is not correct. Ross examined DONOVAN's preparations and concluded the organism belonged to the Sporozoa and proposed the name *Leishmania* in 1903, about eight months before ROGERS' announcement of the discovery of the flagellate stage appeared.

The Intestinal Flagellates of man and Human Coccidiosis are clearly described by Mr. Clifford DOBELL. The condition frequently referred to as "flagellate diarrhoea" is regarded by the author not as a diarrhoea caused by flagellates but merely as one which has caused the flagellates to be discovered.

The ten chapters devoted to the consideration of Malaria contain an enormous amount of useful and accurate information. The general impression one gains from these chapters is that malaria as a disease amongst Europeans and natives in the tropics has not sufficient prominence. The malaria amongst troops returning from the war and the disease as it occurred in England during this period is too much in evidence.

The articles devoted to malarial surveys and malarial prophylaxis are written round the measures undertaken in England in recent years, but the medical man in the tropics is working under very different circumstances and amongst people who are prejudiced and suspicious, and more information concerning the difficulties to be met would not have been out of place in a book of this kind. It would have been better if the whole question of malaria from the point of view of public health had been dealt with by one author. Certain aspects of the subject have already been dealt with in Volume 1, and much of the ground covered there is again traversed in the sections now under review. As an example, subsoil drainage is dealt with in Volume 1 and is illustrated by a picture, while the subject again appears with an illustration in the present section.

The section on the parasites of malaria by Drs. J. D. THOMSON and H. M. WOODCOCK is excellent, and the coloured plates are very good indeed. The character of the various parasites, their differential diagnosis and life-histories are accurately described, though the details of their development in the mosquito naturally do not include certain observations which were published subsequently to the writing of the article. The parasite of malignant tertian malaria is placed in the genus *Laverania*. SCHAUDINN long ago pointed out that a difference in shape of the gametocyte was hardly sufficient ground for a generic distinction, and this is the opinion of the reviewer.

The views of the first of the authors of this chapter as to the presence of a capsule, other than that produced by the red blood corpuscle, around the crescent are stated somewhat dogmatically. The reviewer, at any rate, is not convinced of its occurrence, nor is he inclined to believe that the process of escape of the female gamete through a pore in the capsule, as described here, is a normal phenomenon. In Part v of this article the relation of the human malarial parasites to those of other animals is considered, and the statement is made that WOODCOCK (1914) showed that SCHAUDINN's view of their connexion with trypanosomes was incorrect. It seems somewhat of a paradox that the one observer who for many years persisted in upholding SCHAUDINN's doctrine in the face of overwhelming evidence produced against it by other workers should now take the credit of having disproved the very theory he tried to support. Very little reference is made to abnormal forms of the malaria parasites. The so-called *Plasmodium tenue* is mentioned, but the "tenue" phase of *P. vivax* is not described. An explanation of some of these forms might have been given, and illustrations could, with advantage, have been included. It is the unusual types of the parasites which give rise to difficulties, and workers in the tropics will often refer to this book in the hope of obtaining guidance in such matters.

Four chapters by Colonel S. P. JAMES on the pathology, symptomatology, diagnosis and treatment of malaria deal with almost every aspect of these questions, though it is here that the war element referred to above figures so prominently. Nevertheless, the account is accurately and clearly written, and the reader can rely upon it as giving a true idea of the subject. There are, however, one or two omissions. The influence of shock and exposure in bringing on attacks of malaria is hardly noticed, and the importance of avoiding such attacks in connexion with surgical operations might have been mentioned here, though it will probably be dealt with more fully in another volume. No mention is made of the influence of malaria on women in the tropics, especially in relation to pregnancy, but here again the subject may be left for consideration in a forthcoming chapter.

In a book of this size one would have expected some reference to be made to the important work of SERGENT on the action of quinine in bird malaria, the only malarial parasite that can be satisfactorily studied in animals, work which has yielded results that may possibly have a direct bearing on the therapeutics of the human disease.

The much disputed question of intramuscular injections of quinine in malaria is carefully considered, though the statement that such injections sometimes cause necrosis is hardly accurate. It is probable that every injection causes some necrosis, but the permanent bad effects are seldom observed. It is advised that when quinine cannot be retained by the stomach, owing to persistent vomiting, the drug should be administered intravenously. This advice may be disputed by some clinicians who would prescribe intramuscular injections, reserving the intravenous medication for those cerebral cases which require immediate treatment. The subject of cinchonism and the danger of large doses of quinine should have received more attention, and there is no reference to the possibility of quinine amblyopia.

The general and detailed instructions which have been given for the handling of cases of malaria are quite sound and reliable, and have evidently been carefully thought out. The standard treatment advocated by BASS, though very similar to that recommended here, might have merited explicit mention.

A very useful chapter on serious cases of malaria, its complications and sequelae, is written by Colonel S. P. JAMES and Major S. R. CHRISTOPHERS. Blackwater Fever is rightly included, though for some reason a rather apologetic note explains that this is done for purposes of convenience. The view that blackwater fever is a complication of malaria is well expressed in the statement that prophylaxis against it is the reduction of liability to malaria. The influence of shock and exposure to cold in inducing attacks is not referred to, though it is well known that subjects of chronic malaria frequently suffer on their return from the tropics to the colder climate of Europe. It is exceedingly important for such individuals to keep themselves carefully protected from sudden changes of temperature.

Severe dysenteric types of malaria are referred to. That malaria alone can give rise to a true dysenteric condition is very doubtful. It seems far more probable that in these cases, in spite of negative bacteriological examinations, the two common diseases, malaria and dysentery, coexist.

The final chapter on Balantidiasis by Mr. Clifford DOBELL and Dr. G. C. LOW is complete and calls for no special remark.

A useful key map of the world and a good index complete this interesting volume, which has undoubtedly maintained the high standard set by Volume 1. Very little redundant matter has been included, and a wise discrimination has undoubtedly been exercised in the selection of such matter as will be of service to the medical practitioner in tropical countries.

C. M. Wenyon.

EGYPT. Ministry of the Interior. Department of Public Health. Reports and Notes of the Public Health Laboratories, Cairo.—**Nutritive Value and Characters of Rations issued to Officials and Others in Different Administrations of the Egyptian Government.** [WILSON (Wm. H.)]—57 pp. 1921. Cairo: Government Press. To be obtained from Govt. Publications Office, Old Ismailia Palace, Sharia Qasr el Aini, Cairo. [Price P.T. 20.]

The bulk of this document consists of tables, fifty-seven in all. It is obviously impossible for any reviewer to verify the correctness of this mass of figures. The Egyptian Government is, however, fortunate in being able to command the services of such a capable and trustworthy adviser as Professor Wilson, of Cairo, to whom they owe the compilation of these valuable statistics. He vouches for their substantial accuracy in his preface.

Diets are given for different ages, occupations, etc., for schools, prisons, and other institutions and walks in life. Considerable attention is directed to an adequate supply of calories under various conditions, to the remedy of deficiencies and errors, and in general to a raising of the standards to a physiological basis. Professor Wilson has before urged reform in prison diets; some of his recommendations were carried out, but he again presses home what is still necessary.

The Egyptian diet is much more on a vegetarian basis than our own, but it is shown how this may be compensated for without unduly altering the national habits. On the whole the diets are below the European standard, the paucity of animal protein being the main cause of difference.

Pellagra is a disease which in Egypt is a special danger. Professor Wilson points out that his former advice to increase the protein intake has, where it has been followed, produced a great diminution in the incidence and fatality of the disease.

No special reference is explicitly made to vitamins, but it was evidently at the back of Professor Wilson's mind, as is seen in the articles he recommends as foods. The omission of the actual word is perhaps wise. Government officials are too apt to use or misuse a word which they do not understand, and the use of which (without its practical application) may cover their sins of omission.

W. D. Halliburton.

TROPICAL DISEASES BUREAU.

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PLAGUE: RECENT PROGRESS IN ETIOLOGY, PATHOLOGY AND TREATMENT.

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When writing on recent advances in our knowledge of cholera reference was made to a useful Report, issued by the Ministry of Health. From it statistics were taken for the world incidence of plague from 1914 to 1917 [**Bruce Low** (1920)]; and it will not be necessary to include them in this Review.

Of the bacillus found in buboes by **Yersin** and **Kitasato** in 1894 there is little to be said. It has, however, been shown by **Epstein** (1921) that bi-polar staining, a marked feature used for diagnosis in text-books, is not a phenomenon confined to *B. pestis* and the group to which it belongs. Among other conditions, the method of fixing the specimen influences the result. The organism is non-sporing and non-motile and so far bacteriologists have not confirmed the finding of flagella as seen by **Gordon**. Swollen involution forms are said to occur; but they are rare.

Among those who suffer are rodents, fleas and man. It has been long known that *Mus rattus*, *M. decumanus* and *M. musculus* were liable to epizootic outbreaks and the finding of their dead bodies generally precedes an epidemic among human beings. Of late years many other rodents have been found liable to plague: the tarabagan, *Arctomys bobac*, and the smaller marmot, *Spermophilus citellus*, in China, etc., and also the ground squirrels in California [**Harrison** (1920)]. **Wu Lien Teh** (1921) has proved that both the marmots easily succumb to pneumonic plague produced by inhalation of *B. pestis* in spray. **McCoy** (1921) writes: "We have had natural infection among the ground squirrels (*Citellus beechyii*) of California, the black rats (*Mus rattus*) of Hawaii, one species of wood-rat (*Neotoma*), and a field rodent in Louisiana." Last year L. G. **Haydon** (1921) reported sporadic outbreaks of plague in the Union of South Africa. The Central Health Department, not being certain as to the source of infection, caused specimens of all rodents in the affected region to be collected. A long list of the captured animals is given. Two, the gerbille (*Tatera lobengulae*) and a multimammate mouse (*Rattus coucha*) were infected with *B. pestis* and showed a very heavy mortality over a wide area. In a paper read before the Academy of Sciences, Paris, on February 6, 1922, LEGER & BAURY (1922) stated that in Senegal the shrew (*Crocidura stampflii*) " played a part " in the Dakar epidemic "different to that of the rodents, but not without importance." Living in houses in company with rats, it will receive infected fleas deserting the dead and dying rodents. *X. cheopis* was most commonly found on the shrews, and some of these animals are reported to have died of plague. Shrews consorting with rodents during an epidemic should, therefore, be destroyed. In Bengal (Dacca) *X. cheopis* was rarely found on the shrews and they did not suffer from plague. *C. cerulea* is the common species in India. It not only did not suffer from natural infection but resisted inoculation with *B. pestis* (Report of the Indian Plague Commission).

Of all the fleas that may, or do, convey the plague bacillus from the poisoned blood of the rodent to mankind the most interesting are those belonging to the genus *Xenopsylla* (*Leomopsylla,* etc.). They are the special rat fleas in tropical countries and three species are described [ROTHSCHILD (1914)] :—*X. cheopis* Roths. ; *X. brasiliensis* Baker (1904) (*vigetus* Roths. (1909)), and *X. astia.* All three occur in India, in the western tropics and in Africa ; the syn. *vigetus* was described from specimens sent from West Africa.

Although it had long been known that fleas conveyed the bacillus from rodents to man the exact method was only discovered by BACOT & MARTIN (1914). Previous to their investigations it was thought that infection always took place through scratching the skin at spots upon which fleas had left their excreta. It may be that some infections are thus caused, but the most usual process of introduction of bacilli is by regurgitation of blood. The *B. pestis* multiplies so rapidly in the proventriculus of the flea that after a time it cannot swallow the blood which it is sucking from its victim ; blood filled with bacilli thus flows into the bite. For the flea itself the result may be fatal, since it is sometimes choked by the bacterial growth.

The fleas which are found on rodents include others besides those belonging to the genus *Xenopsylla* and BACOT * (1919) has given a full list of them. Flea carriers of plague infection only act mechanically and no change takes places in the bacillus during its life in those insects. Of the three species of *Xenopsylla, cheopis* is regarded as the most dangerous. *X. brasiliensis* does not readily bite man and *X. astia* bites man with great reluctance at temperatures over 80° F. [PHILIP & HIRST (1917)]. CRAGG (1920) examined 4,270 fleas collected from 18 areas in India :—64 per cent. were *cheopis,* 29·8 per cent. *astia,* and 2·7 per cent. *brasiliensis,* while 2·89 per cent. belonged to the genus *Ceratophyllus.* In the Punjab, where there is much plague, *cheopis* predominates :—Rawalpindi, 92·8 per cent. ; Ludhiana, 93 per cent. ; Sialkot, 85 per cent. ; Jullander, 73 per cent. ; and Jhelum, 86 per cent. From each of these places a few *astia* were sent ; *brasiliensis* was absent. Fleas from Akyab, Burma, which has never been invaded by plague, were 98 per cent. *astia.*

Of the three types of plague—bubonic, septicaemic and pneumonic—all may be started by fleas, but pneumonic plague is known to spread from man to man without their intervention. This form of plague is best known from North China, where the cold is often intense and the marmot trappers live crowded together in underground, ill-ventilated rooms [WU LIEN TEH (1921)]. This form of malady is well described in reports written by the Medical Inspector of French Colonial Troops in Madagascar [ALLAIN (1921)]. The report which refers to the small outbreak of pneumonic plague at the end of June, 1921, should be carefully read. It shows how difficult it may be to diagnose pneumonia due to *B. pestis*, even when other forms of plague have occurred not far away. There were 46 deaths (100 per cent.) from "foudroyant pneumonia" during the coldest time of the year, when penumonia was common. Dr. ALLAIN is an earnest advocate for antiplague serum in treatment and antiplague vaccine for protection. CINTRA (1920-21) reported "a somewhat anomalous epidemic, at first thought to be influenza pneumonica," in S. Paulo, Brazil. The virulence of the infection and the rapid mortality pointed to plague. Examination of the fatal cases resulted in finding a Gram-negative germ resembling *B. pestis*. Plague was killing rats in S. Paulo at that time (*l.c.*). WILLIAMS (1920), writing of pneumonic plague in North America, says:—"Plague pneumonia differs from other forms of pneumonia in three points: after sudden onset, the patient is extremely prostrated with almost no chest signs; by the time the definite involvement of the lungs is demonstrable the patient dies. The sputum is watery, never thick and tenacious, and soon becomes very bloody."

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* The death of this investigator is a great loss to tropical medicine ; he was an indefatigable worker and an entomologist to the manner born.

Papers by SYMMERS (1918) and LEE (1919) give a good résumé of the difference between plague pneumonia and the same disease due to influenza. SYMMERS found that whereas in pneumonia of influenzal origin the pleural cavities are usually free from fluid, in plague pneumonia there is nearly always pleural effusion. He states that in 25 necropsies, carried out by CROWELL, on subjects dying during a Manchurian epidemic, copious pleural effusion was present in every case. Another point noted is the absence of vesicular emphysema in pneumonia due to *B. pestis*. LEE notes the absence of sneezing, etc., accompanying influenzal pneumonia. In plague pneumonia as observed by him the onset, with high temperature, was rapid. Only a few hours passed before the appearance of bloody sputum; 60 per cent. of the patients died within 48 hours, 16 per cent. within 24 hours. Only two patients recovered out of 72,000.

Of the septicaemic type there is nothing of importance to be recorded. It is very fatal and Dr. JACKSON (1917) records cases in which men, apparently in good health, were infected and died within an extremely brief period of time. It was no doubt this sudden death in virulent plague septicaemia which gave rise to the story that the catastrophic decease of the Assyrian army was possibly due to that malady.

The rat being an animal that keeps mainly to the ground, infected fleas quitting them generally bite human beings about the legs. Thus the buboes usually alluded to are those in the groin. With the wider spread of the disease we find that when the epizootic starts among marmots and squirrels which are handled and skinned, buboes form in the axilla and cervical region. It would seem also that in such cases the mortality is likely to be higher than in cases where buboes are confined to the groin. That this is so is shown by MONZIOL & COLLIGNON (1920) and in the cases seen by them the source of infection was *M. rattus*. They observed 44 cases of plague among the civil

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*** See also "Practice of Medicine in the Tropics," Vol. 2, p. 1041, where a photograph of such a room in an underground inn is shown.**

population of Constantinople. In seven only was blood culture positive between the first and sixth day, and of these seven only one recovered—a man with a bubo in the right groin and a positive blood culture on the sixth day. They state that the gravity of the malady varied with the localization of the buboes:—3 cervical with 2 deaths; 5 axillary, 5 deaths; 35 inguinal, 10 deaths. W. T. HARRISON (1921) also points to the greater danger when the buboes are in the upper part of the trunk:—During an epidemic in San Benito, California, Dr. BANNON employed large doses of antiplague serum, and by prompt treatment saved a boy of eight. This, it is noted, was the more satisfactory as the bacilli had settled in the glands of the axilla and scapular region. MCCOY (1921) says that "human cases, traceable to squirrels, almost always have the peculiarity of having the primary buboes in the axilla, due, of course, to the fact that in the handling of infected squirrels, dead or alive, the fleas attack the upper extremities, while when the disease is contracted from rats the chances are that infection will be through the skin of the feet or legs." Certain anomalous and unusual conditions in which the plague bacillus has been found in the skin or subcutaneous tissues with marked oedema [PATANE (1919), DELAMARE (1922)] are recorded; also cutaneous pustular eruptions [ARAUJO (1921); ALVARADO & BACA (1919)].

Perhaps the most satisfactory feature observed as one looks back through the years since 1914 is a certain amount of proof that we possess a useful therapeutic agent in antiplague serum and a valuable prophylactic in antiplague vaccine. Dr. JACKSON (1917) wisely points out that if there is a disease in which early treatment is of value it is plague. He has had good results with the serum and, indeed, apart from it there does not seem to be any treatment for plague, especially the septicaemic and pneumonic types. KRAUS (R.) (1919) considers that antiplague serum prepared with dead bacilli gives the same results as serum prepared with live germs. He states that large doses can be given intravenously without danger and with excellent results. Valuable testimony comes also from Texas where of ten cases receiving serum only two died [LEVY & MCMICKEN (1920)]. From Tunis comes a paper by GOBERT (1921) in which he states that antiplague serum was reported by the medical officers of the various regions to be distinctly useful. From Dr. CAMPAIGNOLLE's report he quotes:—" I had 100 per cent. mortality among the unvaccinated and among those who received serum too late. Among 16 patients, some vaccinated and others treated at once with serum, there was only one death." Dr. ALLAIN's advice with regard to serum and vaccine will be found on pp. 370–371 of Vol. 19. There are still investigators who, forgetting HAFFKINE, are compelling guinea-pigs or rabbits to produce antibodies in response to their own particular brand of antiplague vaccine. We do not know how long artificial immunity to plague lasts; but reference to volumes of this *Bulletin* will show that the antiplague vaccine is much used in the tropics and there are many testimonials to its value.

Among other methods of reducing plague are the destruction of rats and fleas and the building of rat-proof houses. We have yet to discover the best way of abolishing rats and there is little chance of complete success. Where "deratization" is most necessary is on ships, especially those ships which carry grain or food in bulk.

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PHILIP & HIRST (1917), x, 281.
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SYMMERS (1918), xiii, 327.
WILLIAMS (1920), xvi, 428.
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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

KALA AZAR.

i. NAPIER (L. E.). **A New Serum Test for Kala-Azar.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 830–846. With 1 plate.
ii. MILLS (P. S.). **Note on the Formalin Test as applied to the Diagnosis of Kala-Azar.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 847–849.

i. Attention has already been called to the new formol-gel test for kala azar (this *Bulletin*, Vol. 19, p. 4) as described by SPACKMAN and Napier. In this paper the author goes more fully into the question. The reaction depends not on the gel formation, but on the white opacity which appears. Accordingly the author thinks that the name " Formol-gel test for kala azar " is inappropriate and proposes the term " Aldehyde test."

To carry out the test, 5 cc. of blood is drawn from the vein and allowed to stand till serum separates. Of this 1 cc. is placed in a small test tube half an inch in diameter, and after the addition of one drop of commercial formalin (30 per cent. formaldehyde) the tube is well shaken and kept at laboratory temperature. Within a minute or two the serum will have set so that the tube can be inverted. It will then begin to show a whitish opalescent colour. After 3 to 20 minutes the whole of the serum will have become absolutely solid and opaque, like serum coagulated by heat or the " white " of a hard boiled egg. If the serum is blood-stained it will have a pink tinge which will turn chocolate brown after 24 hours.

A large number of controls have been carried out and these have shown that in some diseases the serum will solidify in half an hour, or even less, while some degree of opacity develops after a few hours. The serum of healthy persons remains clear and fluid for an indefinite period. In the case of young children with kala azar the opacity may not be complete, but in other diseases of children there is not even a partial opacity as seen in adults.

Two exceptions are mentioned of cases of malaria with large numbers of parasites in the blood. The sera of these solidified in a few minutes and developed a marked degree of opacity. After standing 24 hours, they had a characteristic greenish tinge which made them easily distinguishable from kala azar sera.

An attempt was made to gauge the degree of opacity. A small cylindrical cell measuring 1·25 cm. in diameter, 0·4 cm. in depth, and having a capacity of 0·5 cc., was used. The Thoma-Zeiss haemocytometer white blood corpuscle pipette also has a capacity of 0·5 cc., and this is employed to take up 1 part of 20 per cent. formaldehyde and 10 parts of serum. The contents are immediately expelled into the cell, which is placed over some standard print. The time taken for the opacity to develop to the extent that the print becomes unreadable is noted. In the two malaria cases noted above the print was still decipherable after 24 hours, whereas in all cases of untreated kala azar it was unreadable in from 3 to 20 minutes, or, exceptionally, in two hours.

In 150 cases where the condition simulated kala azar and in which satisfactory spleen puncture was carried out the aldehyde test corresponded with the puncture findings in 98 per cent. The details of these cases are set forth in tabular form. The aldehyde test was compared with the Wassermann reaction in 86 of the 150 cases.

Of 60 which gave a positive aldehyde test 12 gave a positive Wassermann, 7 a partially positive one, and 41 a negative reaction. Of 26 which were negative to the aldehyde test 4 were positive to the Wassermann test, 5 partially positive, and 17 negative.

A further series of 50 controls of persons suffering from various diseases is given in another table. It was only in tuberculosis and leprosy cases that any clouding of the serum occurred.

The test was then applied to a series of cases of kala azar undergoing antimony treatment. Of 29 cases thus tested it was noted that there was a definite tendency for the reaction to disappear, so that the progress of the patient can be measured in an accurate manner.

The best method for carrying out the test is that described above, but various modifications are suggested in which blood is taken from the finger. The best of these is as follows :—Four drops of blood are taken from the patient's finger into a small test tube containing 0·5 cc. of citrate saline solution (sodium chloride 0·85 gm., sodium citrate 0·5 gm., water 100 cc.) in which there is one drop of formalin ; if this is left overnight the red blood cells settle and the supernatant fluid will be milky in kala azar cases and clear in others.

The chemistry of the reaction is not obvious. It was found that a pure solution (10 per cent.) of formaldehyde specially prepared in distilled water gave clearer results than the commercial product. One drop of this is added to 1 cc. of serum. The reaction is essentially an aldehyde one, as acet-aldehyde also gives the reaction but less completely and more slowly than the lower aldehyde.

A coloured plate illustrating the test accompanies the paper.

ii. In this note on the formol-gel test for kala azar the author mentions that it was carried out in eleven cases in which spleen puncture was done. In five cases both the formol-gel test and the finding of leishmania in spleen smears were positive, while in six both were negative. In one of the negative cases the serum jellied in 30 minutes, and Napier adds a note to the paper stating that he has also seen such cases where there is delay in the solidification of the serum.

C. M. Wenyon.

GANGULY (L.). [**The Formol-gel Test in Kala-Azar.**] [Correspondence.] —*Indian Med. Gaz.* 1922. Feb. Vol. 57. No. 2. p. 77.

The letter is an account of the author's experience with the formol-gel test in kala azar as advocated by SPACKMAN and NAPIER (this *Bulletin*, Vol. 19, p. 4), and FOX and MACKIE (Vol. 19, p. 310). It was found that in some verified cases of kala azar the serum did not become both opaque and jellied in five minutes and that it often jellied earlier than it became opaque. In all cases a jelly was formed in ten minutes, but in only six was it completely formed in five. In only two cases was complete opacity present in five minutes and in only four in ten minutes. In a case of syphilis the serum was completely jellied and opaque in ten minutes.

C. M. W .

CHRISTOPHERSON (J. B.). **The "Blue Bodies" in Leishmaniasis.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Apr. Vol. 15. No. 6. pp. 21–24.

The paper describes certain blue bodies which the author has seen in smears of Oriental sore. He states that they are constantly present and are an aid to diagnosis in that, when seen, they justify the assumption that further search will lead to the discovery of leishmania. They are usually about the same size as the parasite, but may be larger or smaller. Some of them have the appearance of blue rings. One or two red dots may be present. The origin and significance of these bodies is discussed. Some may be portions of the cytoplasm of the large cells, others may be derived from the leishmania themselves. It is evident that many leishmania ultimately disappear in the body and it is suggested that some of the blue bodies may represent stages in the degeneration of the parasites. It was found that if the flagellates in cultures were treated with tap water they became spherical, lost their flagella, and, when stained, had a remarkable resemblance to the blue bodies as found in smears of Oriental sore.

C. M. W.

YOUNG (Charles W.) & VAN SANT (Helen M.). **The Diagnosis of Kala-Azar by Blood Culture.**—*Proc. Soc. Experim. Biol. & Med.* 1922. Mar. 15. Vol. 19. No. 6. pp. 299–302.

By adopting a special technique, the authors have succeeded in obtaining cultures of leishmania in nine of ten samples of the peripheral blood from five cases of kala azar in North China.

Since the authors believe, as others have done, that excess of human serum is detrimental to growth, the blood (10 cc.) drawn from the vein into a syringe containing 2 cc. of Locke's solution was at once transferred to a flask containing 50 cc. of the same solution. This was centrifuged at low speed to bring down the red cells only. The supernatant fluid was then centrifuged at high speed and the deposit of leucocytes distributed in tubes of N.N.N. medium. The latter differed from that usually employed in that 0·2 per cent. potassium phosphate (K_2HPO_4) was added as a buffer. The salt-phosphate agar was adjusted to P_h 6·8 to 8·2. It is claimed that in this medium the growth is better and persists longer than in medium containing no buffer.

A positive culture from the peripheral blood was obtained in two cases after intravenous treatment with colloidal antimony had been in progress some time—one case had received during 14 days 121 cc. of the suspension, equivalent to 0·173 gm. of metallic antimony. Eight hours before the culture was made 20 cc. had been administered intravenously. The second case had received 377 cc. of the suspension of antimony during the 33 days preceding the culture. The last dose of 30 cc. had been given three days before the culture was made.

C. M. W.

GUPTA (Biraj Mohan Das). **A Note on Some Cultural Phases of** ***Leishmania Donovani.***—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 809–813. With 1 plate.

The paper records the results of the experimental inoculation of a monkey with kala azar. The interesting feature of the infection was that attempts to find parasites in films of the peripheral blood, liver and spleen puncture material of the monkey failed entirely, whereas cultures from the spleen and liver material were positive on three occasions.

Some peculiarities of the cultures are recorded, and the author believes he has seen cysts which contain a number of flagellates which eventually escape. In the fresh condition the cysts measure 12μ in diameter and are packed with what are called "tiny and very active 'second generation' flagellates." [It is difficult to form an opinion as to the real nature of these cysts, which, being of the size mentioned, can hardly have been formed by the rounding-off of even the largest of the flagellate stages. The reviewer has never seen cysts in cultures at any stage, and it occurs to him that they may be globules of material containing numerous flagellates.]

C. M. W.

FRANCO (E. E.). **Anatomia patologica della leishmaniosi infantile.**—*Arch. Portugaises des Sci. Biologiques.* Lisbon. 1922. Vol. 1. No. 1. pp. 31–95 With 3 plates.

This long paper of over 60 pages contains a detailed study of the morbid anatomy and histology of cases of infantile kala azar in Portugal. The reviewer cannot find in it any essentially new information and the two plates showing sections of the organs and cells infected with leishmania are very similar to those published by other observers. As in another paper by the same author reviewed in this *Bulletin*, the terms employed for the cells are quite unfamiliar to the reviewer.

C. M. W.

FRANCO (Enrico Emilio). **Sulle leishmaniosi. Relazione al Congresso Luso-Spagnuolo di Porto—Giugno 1921.**—Reprinted from *La Med. Ital.* Milan. 1922. Feb. 28. No. 2. 4 pp.

——. **Hémo-histioblastes et leurs dérivés monocytiques, lymphocytiques et granulocytiques dans la rate et dans le sang circulant d'enfants atteints de leishmaniose.**—Reprinted from *Jl. Sci. Mat. Fis. e Nat.* Lisbon. 1922. 3rd Ser. No. 9. 6 pp.

The greater part of the first of these papers is very similar to the one reviewed in this *Bulletin* (Vol. 19, p. 309). It contains some statements on the nature of the cells which are infected with leishmania, a subject which is discussed more fully in the second paper. The author believes that the large cells (macrophages), which contain leishmania in the spleens of cases of kala azar, are of two types. He discusses these cells, their origin and fate, and in so doing employs terms such as hémo-histioblastes of Ferrata and polyblasts of Maximow, which may be familiar to students of applied haematology, but hardly so to the majority of the readers of this *Bulletin*.

C. M. W.

FRANCO (E. E.). **Leishmaniosi viscerale dell'adulto (Kala Azar).**—*Pathologica.* 1922. Apr. 1. Vol. 14. No. 321. pp. 193–196.

A case of kala azar in an adult negro, 24 years of age, who had lived in Portugal since the age of two. The diagnosis was first made by the discovery of leishmania in the peripheral blood during an examination for malarial parasites. The condition of the blood is described in detail and the cells of the spleen which were infected are regarded as of a different type from those which contain parasites in infantile cases of the disease.

C. M. W.

D'OELSNITZ, BALESTRE (P. L.) & DAUMAS (A.). **Un nouveau cas de Kala-Azar infantile en France.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 6. 38th Year. 3rd Ser. No. 12. pp. 550–553.

Infantile kala azar was first shown to exist in France by LABBÉ, TARGHETTA and AMEUILLE, who discovered two cases among Serbian refugee children at Nice (this *Bulletin*, Vol. 12, p. 198). There was reason to believe that the disease was locally contracted, and this is borne out by the authors of the paper under review, who have met with another case in the same locality, which they now record. Diagnosis was established by spleen puncture. There appear to be no features of special interest in this case, which proved fatal owing to its advanced stage when first seen.

C. M. W.

NAPIER (L. E.). **Kala-Azar: A Preliminary Note on the Treatment by the Intramuscular Injection of a Special Preparation of Sodium Antimonyl Tartrate.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. pp. 10–16. With 4 charts.

In the opening remarks of this important communication, the author points out that when the compilers of the British Pharmacopoeia laid down the necessary standard of purity for sodium and potassium antimonyl tartarate it was not realized that these compounds would be used extensively for intravenous injections. As some of the samples of the drugs are " heavy " and others " light," and as the residue left after attempted solution varies considerably with different samples, it is evident that the constitution of the drugs as supplied is not constant. The author found that a number of samples varied in appearance, solubility and their power of producing a precipitate in blood serum *in vitro*. It is supposed that this precipitate may account for some of the unpleasant symptoms which may follow intravenous injections.

With one sample which had been specially prepared for intravenous injections there was no residue when attempt at solution in water was made, and, furthermore, this sample produced the smallest amount of precipitate in blood serum.

Experiments on rats were undertaken. Doses of this sample were injected into the muscles of the thigh, and it was found that after 48 hours there was no local inflammation. Tried on himself by subcutaneous injection, the author found that the drug gave rise to a distinct stinging sensation for three minutes, but that after this there was no pain, though a small lump remained which was painful on pressure. Intramuscular injection was much less painful at the time and afterwards. The drug was then tried in cases of kala azar. A 2 per cent. solution in distilled water was employed and a dose rising to 2 cc. was given every other day, commencing with 0·5 cc. The two deltoid and gluteal muscles are used in rotation, so that the same muscle is not used again for eight days. Eleven cases have been treated by this method, and, though the observations have not yet covered a period of more than four months at most, the author feels justified in concluding that at least eight of them may be pronounced as cured, while the other cases are regarded as still incompletely cured.

It is emphasized that this method of treatment was adopted not because it was expected to yield better results than intravenous medication, but that in children and cases with severe lung symptoms it is impossible to give the drug intravenously. The eleven cases treated received nearly 300 intramuscular injections, and in only six instances did an abscess result. It was necessary to open only two of these.

The intramuscular treatment is recommended for the following cases :—

1. Patients who show signs of any marked degree of catarrh of the bronchioles, or who have been previously shown to be liable to lung complications.
2. Patients in whom very small doses of intravenous antimony cause violent coughing and vomiting.
3. Patients with feeble pulses and low blood pressure.
4. Young children with very small veins.

C. M. W.

SAMUT (Robert). **Colloidal Antimony in Leishmania Infantum.**—*Lancet.* 1922. May 20. p. 995.

The writer treated a case of kala azar in a child 4 years of age in Malta with intramuscular injections of colloidal antimony. The preparation used was one made by Messrs. Chatelain, of the Laboratoire des Colloïdes, 2, Rue de Valenciennes, Paris. The strength of the solution was 0·001 gm. of sulphide of antimony in 1 cc. of distilled water, and 3 cc. were contained in each phial. The contents of one phial were injected on each occasion. The improvement in the child's condition was remarkable, but it died from a severe attack of epistaxis. In spite of this reverse the author is convinced that this method of treatment is a distinct improvement on intravenous injections of tartar emetic.

C. M. W.

i BRAHMACHARI (U. N.). **A New Form of Cutaneous Leishmaniasis—Dermal Leishmanoid.**—*Indian Med. Gaz.* 1922. Apr. Vol. 57. No. 4. pp. 125–127. With 2 plates.

ii. MEGAW (J. W. D.). **A Note on a New Disease—" Dermal Leishmaniasis " (Brahmachari).**—*Ibid.* p. 128.

The first of these papers was read by the author at the Medical Section of the Asiatic Society of Bengal on February 8, 1922. In it he describes a new form of cutaneous leishmaniasis which appeared in four cases which had completed a treatment for kala azar six months to two years previously. There was an eruption on the skin which had the appearance of tubercular leprosy. No leprosy bacilli could be found, but the remarkable discovery was made that the skin lesions were due to infection with the parasite of kala azar. All these patients had apparently recovered from kala azar after injections of antimony. The author points out that such treatment of kala azar may have four results. The patient may be cured, he may appear to be cured and then relapse, he may not improve at all, or, finally, after cure of his visceral infection he may develop the curious condition described in this paper.

Details of the fourth case are given and the condition is illustrated by an excellent coloured plate. The case was typical of kala azar, and was treated with intravenous injections of tartar emetic, 30 of which were given. He was regarded as cured. At the beginning of 1919 (apparently about six months after he was discharged cured) he noticed faint white patches on his face. They gradually spread over the whole body. They were neither anaesthetic nor hyperaesthetic. During the cold weather they became worse, and papillomatous nodules appeared on the face, trunk and extremities. At the time the paper was written the condition of the patient was as follows.

The whole body was covered with eruptions as described below :—

1. On the face papillomatous nodules somewhat resembling small leprotic nodules.
2. Slight erythematous appearance on the cheek and forehead.
3. The trunk and extremities showed slightly raised brown patches. A few papules were also present.
4. On the extremities, especially the lower, erythematous patches.
5. The various lesions showed no tendency to ulceration, and there were no lesions of the mucosae.

There was no constitutional disturbance. The liver and spleen were not enlarged, and leishmania could not be found on spleen puncture. Apart from a slightly lowered haemoglobin index the blood picture was practically normal.

Of the three other cases one resembled that just described, while in the others the rash was limited to the face.

Such cases as these naturally afford a field for speculation as to the relationship of kala azar and Oriental sore. The author concludes that the lesions are caused by *L. donovani*, which had been modified by antimony treatment, and that the virus was attenuated and a deadly visceral leishmaniasis converted into a benign cutaneous form. [It should be remembered that in animals the virus from the spleen of cases of kala azar can produce purely local skin lesions, while that of Oriental sore can give rise to a generalized infection. The author is hardly justified, as the writer of the second paper points out, in concluding that the cases described establish the identity of the parasite of kala azar and Oriental sore.]

ii. The author of the second paper discusses these curious cases. He proposes to call the condition, an instance of which has been seen by his assistant, Post-Antimonial Dermal Leishmaniasis, in place of the name Dermal Leishmanoid suggested by BRAHMACHARI.

[It is perhaps of interest to recall the fact that CHRISTOPHERS in 1904 (*Sc. Mem. Off. Med. & San. Depts.*, Govt. India, New Series, No. 11) described the occurrence of a papular eruption which occurred about the thighs, Scarpa's triangle and scrotum of cases of kala azar. Less commonly it occurred on the trunk, arms and neck. Some of these papules appeared to ulcerate, and in the lesions leishmania were found. It seems not impossible that BRAHMACHARI was dealing with the same condition in an aggravated form.]

C. M. W.

*CONNOR (F. P.) & SHORTT (H. E.). *Leishmania tropica* **Infections in Mesopotamia.**—*Indian Jl. Med. Res.* 1918. Oct. Vol. 6. No. 2. pp. 162–173. With 2 charts and 4 figs. in text.

In this paper the authors write of their experiences of Oriental sore in Mesopotamia during the war. They were able to demonstrate that many of the cases which were diagnosed " I.C.T." (inflammation connective tissue) were actually due to infection with *Leishmania tropica.* It is pointed out that the organism is often very difficult to discover when secondary bacterial infection has supervened. The prevalence of the condition is illustrated by the admissions to a Basra hospital during January, 1918: 307 cases resembled Oriental sore, and of 187 consecutive cases *Leishmania tropica* was found in 95. The disease was known to be prevalent in the up-river towns, Amara, Baghdad, Nasariyeh and Ahwaz, but Basra also provided many, for of a series of 125 cases 46 were probably infected in Basra. Many trivial cases passed unnoticed, unless specially looked for. In one small unit 35 cases were found amongst men who had not reported sick.

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* It is regretted that this interesting paper is noticed so late. The title was included in the Lists of References (Vol. 13), but failed to reach the Sectional Editor.—[ED.]

The case of a sepoy is mentioned who came to hospital with large sores on the wrists and forearms. There appeared eight days later 28 small papules on the back and flanks. In these the specific parasite was found. In two or three weeks the papules had mostly dried and healed, the original sores persisting for over two months. This case suggests blood infection from a primary sore leading to secondary sores. Several cases of Oriental sores commencing at the site of a wound or abrasion are referred to. In six cases nodules, partly intradermal and partly subcutaneous, appeared above the site of infection. On excision these were found to contain *L. tropica.* In no case did they develop into ulcers or sores resembling Oriental sore.

Several cases were noted in which the original sores were large and few in number, while at intervals of days or weeks numerous small, less active sores appeared about the body. As a rule the disease is not associated with any constitutional disturbance. In no case was involvement of the mucosae noted.

As regards treatment the authors state that there is no specific remedy. They found CO_2 snow followed by methylene blue ointment, strong solution of iodine, or zinc sulphate ointment, useful in some cases. In others ionization (zinc or mercury ions) has yielded good results, as also treatment with black wash alternating with calomel powder.

The cases usually seen can be placed in four categories :—

(*a*) Large open sores, ¾ to 1½ in. in diameter, with hard, round, indurated and pigmented edges, with a tendency to healing in parts.

(*b*) Somewhat smaller open sores, with red oedematous and obviously infected tissue surrounding them.

(*c*) Subcutaneous unbroken nodules with involvement of the overlying skin and appearing as if about to break down.

(*d*) Small papules $\frac{1}{16}$ to ⅛ in. in diameter.

The best method of discovering leishmania in these various types is discussed. The fine drawn out pipette is useful in types (*b*), (*c*) and (*d*). For sores of type (*a*) it is best to snip out a portion of the edge of the ulcer with fine curved scissors and to make smears with the piece of tissue. A sharp, curved scoop is most useful in sores of type (*a*) for obtaining material for making films. The scoop can be made from a straight Hagedorn needle of largest size by cutting off the point and grinding to make a small curved spatula, the edges of which are sharpened. The spatula is then bent at the end.

C. M. W.

FRANCO (Enrico Emilio). **Contribuzione alla conoscenza dell' anatomia patologica della Leishmaniosi cutaneo-mucosa od americana.**—*Arch. per le Sci. Med.* 1921. Vol. 44. pp. 246–267. With 11 plates.

This long paper describes the conclusions to which the author has come as to the histological changes which occur in the lesions of South American cutaneous leishmaniasis. Numerous ulcers which occurred in various parts of the body, including the mucosa of the nose of a case of Brazilian origin, were studied. The patient had died of cachexia resulting from the prolonged illness. The appearances seen in sections of each ulcer are described separately and the nature of the large cells, which include the parasites, is discussed. A series of plates illustrates the condition of the patient and the character of the tissues as seen in smears and sections.

C. M. W.

YOOSUF (A. K.). **Aleppo Boil; also called Delhi Boil, Kandahar Sore, Oriental Sore.**—*Boston Med. & Surg. Jl.* 1922. May 18. Vol. 186. No. 20. pp. 675–677.

The only interest of this paper lies in the revelation it provides of the slowness of the dissemination of human knowledge. It might have been written more than twenty years ago, for the etiology of Oriental sore is discussed as if the parasite *Leishmania tropica* did not exist. With the utmost complacency the author concludes that the disease is of a parasitic nature and quotes VIRCHOW in support of this theory. German writers are said to have recently discovered an animal parasite belonging to the family " Leishman farunculosa," an organism which some think " similar to that of syphilis, sleeping sickness or continued fever." The author inclines to the view that a micrococcus is the cause of the disease.

The reviewer, whose business it is to read the literature on this and kindred subjects, can but offer a protest against the inclusion of such a paper in a well-known medical journal.

C. M. W.

i. NEWMAN (R. E. U.). **Note on Three Cases of Infantile Kala-Azar.**—*Jl. Roy. Army Med. Corps.* 1922. May. Vol. 38. No. 5. pp. 379–381.
ii. GASTOU (Paul). **Cinq cas de leishmaniose cutanée.**—*Rev. Méd. et Hyg. Trop.* 1922. Mar.–Apr. Vol. 14. No. 2. pp. 33–37.
iii. RIGHI (I.). **Per la leishmaniosi in Sardegna.**—*Sperimentale.* 1922. Vol. 76. No. 1–3. pp. 87–98.

i. A record of three cases of kala azar in children in Malta.

ii. A record of five cases of Oriental sore, one from Morocco, one from Cilicia, and the others from Biskra.

iii. A record of a case of cutaneous leishmaniasis in Sardinia accompanied by a long dissertation on leishmaniasis in general.

C. M. W.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Gill (C. A.). **Relapsing Fever in the Punjab. (A Preliminary Report.)**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 747–780. With 3 charts and 4 maps.

When the official summary of the facts and figures bearing on the incidence of malaria in the Punjab for the year 1920 was being prepared it became apparent that something unprecedented had occurred in connexion with the mortality returns under the head of fevers, which showed a phenomenal rise during May and June. It had been conclusively demonstrated that during this particular year the malaria was of a specially mild type, so that it was evident that the increased mortality of these two months was due to some other cause. In this report the author arrives at the conclusion that it was due to a widespread epidemic of relapsing fever, which was responsible for the death of at least 26,000 persons and the sickness of at least ten times this number.

By a series of careful arguments it is shown that this heavy mortality can be attributable to no other cause than relapsing fever, and that similar outbreaks had occurred in the years 1869, 1878, 1891 and 1906. The author has something to say about the Indian vital statistics, which are usually regarded as so unreliable as to be valueless for scientific purposes. He admits the numerous fallacies they contain, but argues that if rightly considered they are capable of throwing considerable light on the incidence of many epidemic diseases. It is neglect of this fact which is responsible for the relative abandonment, more especially in recent years, of epidemiological research in India.

In this epidemiological study the author is not concerned with the cause of the outbreaks nor the factors which influence them, but with the figures and statistics which justify him in concluding that relapsing fever is a disease which must be regarded as widely endemic in the Punjab, and which at more or less regular intervals assumes an epidemic form. The report, which will prove of great interest to the epidemiologist, is illustrated with numerous maps, tables and charts.

C. M. Wenyon.

Cragg (F. W.). **The Epidemiology of Relapsing Fever in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Feb. 16. Vol. 15. No. 8. pp. 236–252. (Discussion, pp. 252–256.)

By a study of the vital statistics very similar to that undertaken by Gill for the Punjab (see above), the author has reached the similar conclusion that relapsing fever is endemic in the United Provinces in numerous foci, and that periodically it spreads from these in epidemic form. Seeking an explanation of these outbreaks, the author finds it in the bionomics of the louse. In the cold weather in India the louse is dependent upon the human body, which has a higher temperature than the surrounding air. With the advent of the hot weather the temperature and humidity of an ordinary Indian house becomes the optimum for this insect. When, therefore, the temperature of the air approximates to that of the body there is no retarding of the insect's metabolism when it is temporarily separated from its host.

On the other hand it becomes exceedingly active and lays eggs freely. As the temperature rises still more towards the end of April and early in May, the optimum is passed and the lice begin to die off. In the early part of the hot weather there is thus a period which is specially favourable to this insect. The seasonal incidence of relapsing fever is explained by the reaction of the insect host of the spirochaete to the varying climate. The occurrence of relapsing fever in epidemic form is to be accounted for by an alteration of the usually prevailing conditions. If for some reason the temperature does not rise rapidly in May and the humidity of the atmosphere also remains high, the optimum conditions for the louse are much prolonged, while the natural climatic delousing which normally occurs in May and continues through the hot weather is much curtailed. In consequence many more lice survive the hot weather, they multiply on the human body during the winter, and when the optimum period is reached in the succeeding year there is an enormous increase in the number of lice which bring about epidemics of relapsing fever. The arguments brought forward in favour of these views are illustrated by actual experiments conducted by the author and by figures from the statistics.

C. M. W.

HAROLD (C. H. H.). **Tick Fever in East Persia.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1922. May. Vol. 38. No. 5. pp. 398–400.

In this letter the author refers to his previous paper (this *Bulletin*, Vol. 17, p. 372) on relapsing fever in Persia. He thinks that an erroneous impression has gained ground (see Manson's Tropical Diseases, MANSON-BAHR) that the disease in this country is of a particularly mild type. On the contrary it is, if anything, exceptionally severe, the short duration of the illness and the low mortality rate amongst the cases seen being due to early diagnosis and immediate treatment with salvarsan products.

As regards the vector, he is strongly of opinion that, though *Argas persicus* may occasionally serve, *Ornithodorus lahorensis* is the real vector. He brings forward evidence to show that though men came in contact with *Argas persicus* there was little evidence that they were actually bitten by this tick, but there was good reason to suspect *O. lahorensis.*

C. M. W.

VAN DEN BRANDEN & VAN HOOF. **Recherches sur la fièvre récurrente africaine.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 220–229.

The paper contains a description of investigations on relapsing fever in the Congo. Having been informed by RODHAIN that the flying-fox (*Eidelon helvon*) could not be infected with the organism of relapsing fever, the authors attempted to infect these animals by intravenous injections of blood and by the bites of known infected ticks (*Ornithodorus moubata*). In no case was an infection produced.

The existence of relapsing fever transmitted by *Ornithodorus moubata* in Central Belgian Congo is established, and it is evident that several endemic foci of the infection exist. The disease produced in man does not differ in any way from relapsing fever seen by them in German East or other parts of Africa. It is pointed out that though kharsivan will usually arrest the disease, in some cases the typical course is run after a dose of 0·6 gm.

The question of the leucocytic formula of the disease is discussed. It has been maintained that during the attack there is an increase in mononuclear cells above the normal with a decrease below the normal during the intervals. The authors produce evidence to show that though this change may occur in some cases, in others it does not, while the leucocyte formula of the natives is naturally so irregular that the blood picture in relapsing fever in the Congo cannot be regarded as pathognomonic of the disease.

C. M. W.

PINO-POU (R.). **La Fiebre Recurrente en general y particularmente en Venezuela.**—*Gac. Méd. de Caracas.* 1921. May 15, May 31 & June 15. Vol. 28. Nos. 9, 10 & 11. pp. 111–123, with 9 figs.; pp. 125–137, with 6 figs.; pp. 139–150, with 6 figs.

The discovery of cases of relapsing fever in Venezuela is made the text of a long dissertation on this well-known disease. The statement that the spirochaete differed morphologically and biologically from those of other countries evidently cannot be taken seriously. It was inoculable to rats, and the claim is made that on one occasion transmission was effected experimentally in rats with *Cimex rotundatus*. *Ornithodorus talaje* is suspected of being the vector.

C. M. W.

OETTINGER (J.) & HALBREICH (J.). **Ueber das Vorkommen einer ephemeren Roseola beim Rückfallfieber.** [The Occurrence of an Ephemeral Roseola in Relapsing Fever.]—*Münch. Med. Woch.* 1922. May 26. Vol. 69. No. 21. pp. 778–779.

In a number of cases of undoubted relapsing fever seen in Russia the authors have noted the occurrence of a rash which is ephemeral in nature, and appears, as a rule, shortly before the crisis of the first attack. The roseola may be uniformly distributed over the whole body or confined to limited areas of the skin, so that a careful examination may have to be made to discover it. Each small red spot, which is the form taken by the rash, lasts from not more than one to two hours. Sometimes the spots disappeared in a shorter time than this. The period during which the spots appear and disappear is about 24 hours. The rash was noticed in 15 per cent. of all the cases observed.

C. M. W.

MAYER (Arthur). **Spirochäten und Blutbild beim Rückfallfieber.** [Spirochaetes and the Blood Picture in Relapsing Fever.]—*Ztschr. f. Klin. Med.* 1922. Jan. 25. Vol. 90. Nos. 1–3. pp. 141–163, With 12 charts.

This is a long paper describing the condition of the blood in relapsing fever. As regards the spirochaetes, the normal course is for them to disappear from the blood shortly before the crisis of each relapse and to reappear just before a relapse. In some cases the spirochaetes reappear earlier than usual, with the result that the intervals between the febrile attacks are shortened; in others, however, though the spirochaetes reappear, the access of fever does not occur till after the usual interval. Occasionally the spirochaetes may be present in the blood continuously though the temperature chart shows fever of a relapsing type with several periods of apyrexia; in such cases the prognosis is bad. In what the author calls a septic-bilious form of the disease the spirochaetes may be entirely absent from the blood or present only on a single day in small numbers. The symptoms associated with this condition are intense jaundice, haemorrhagic diarrhoea and coma. The tissues of fatal cases show the lesions due to a septicaemia, and isolated spirochaetes can be found in the liver. Attention is called to the slight rises in temperature which may occur between the relapses and during convalescence of normal cases. In such abortive attacks spirochaetes may or may not be present for a short time. In three cases spirochaetes were found 19 days and in one 22 days after the last attack of fever.

During convalescence the increase in the number of the red blood corpuscles, which have decreased during the attack, is retarded if spirochaetes persist in the blood. For the period of such persistence the Arneth index is deflected to the left. The leucocytosis is due to an increase in neutrophile cells, and, unlike that occurring in malarial attacks, persists, though it is less marked during the afebrile intervals. There is a definite increase in the number of large mononuclear cells, while that of the eosinophiles is decreased.

C. M. W.

KARWACKI (L.) & KRAKOWSKA (Z.). [**O zachowaniu sie bialych cialek Krwi w goraczce powrotnej. (Les leucocytes dans la fièvre récurrente.)**]—*Lekarz wojskowy* (*Méd. Milit.*). 1921. No. 29. [Summarized in *Bull. Inst. Pasteur.* 1922. Mar. 15. Vol. 20. No. 5. pp. 200–201.]

The leucocyte formula of the blood in relapsing fever varies with the period of the disease. During the febrile stage there is a leucocytosis of 10,000 to 15,000. This is mainly due to an increase in the polymorphs. This persists for some days after the crisis and gradually disappears during the fifth to the ninth day. The proportion of lymphocytes increases after the crisis and may reach a percentage of 42, but in cases which will not relapse it gradually declines and the blood picture becomes normal. If the high percentage of lymphocytes persists, a relapse may be expected.

C. M. W.

SANGIORGI (Giuseppe). **Le spirochetosi dei muridi (Considerazioni critiche). Nota 1.**—*Pathologica.* 1922. May 1. Vol. 14. No. 323. pp. 253–256.

Since CARTER described a small spirochaete (*S. minor*) from the blood of rats in India, a number of similar organisms have been discovered in rats and mice in different parts of the world. In this paper the author discusses these various forms and compares them with *S. morsus muris*, the causative organism of rat-bite fever. The details of the discussion lose much of their value from the fact that the author has overlooked a letter written by the reviewer (WENYON, *Lancet*, 1906, Vol. 2, p. 954), which states that *S. laverani* Breinl and Kinghorn is identical with *S. muris* Wenyon. The latter was studied by the reviewer in mice in Paris, and it was in one of the reviewer's inoculated animals that BREINL and KINGHORN saw the organism which they named *S. laverani*.

The reviewer also examined the spirochaete seen shortly before by BORREL in the tissue of mice at the Pasteur Institute, and found it was identical with the form studied by him there.

Though the organism named *S. laverani* was from the same material as that named *S. muris*, the author of the paper under review regards them as different species. It is evidently quite incorrect to group together as a single species (*S. minor*) the short forms of CARTER and WENYON and the long form, *S. crucidurae*, of LÉGER, and as another species (*S. murinum*, a new name), *S. laverani*, *S. morsus muris* and other forms. The reviewer has examined *S. morsus muris*, and it, at any rate, is identical with *S. laverani*, *S. muris* and the short spirochaete of BORREL.

C. M. W.

KASAI (Katsuya). [**On the Differential Diagnosis of** *Spirochaeta morsus muris* **and** *S. muris*.]—*Chuwo Juikwai Zasshi* (*Jl. Central Vet. Soc.*). 1921. July. Vol. 34. No. 7. [Summarized in *Japan Med. World*. Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 16.]

By inoculation experiments on rats, mice and guinea-pigs, and serological tests involving Pfeiffer's reaction and the protective properties of immune sera, the author has established the fact that the small spirochaete obtained from cases of rat-bite fever and the slightly larger form occurring naturally in rats and mice are identical.

C. M. W.

GUPTA (Biraj Mohan). **Short Notes on a Case of Rat-Bite Fever in Shillong.**—*Indian Med. Gaz.* 1922. Apr. Vol. 57. No. 4. p. 139.

The paper records a case of rat-bite fever in a Hindu lady who was bitten on the forehead by a rat. Though the wound had healed, on the ninth day its site became oedematous and painful, and there was a rise in the temperature, which oscillated between 101° and 102·8° for three days. The temperature fell and remained normal for four days, when there was a second attack, which lasted six days. During this attack there was more reaction at the site of the bite and the glands on both sides of the neck became swollen. Blood was inoculated into two mice, one of which was killed six days later. In the heart blood *Spirochaeta morsus muris* was discovered and the diagnosis of rat-bite fever established.

C. M. W.

VINCENT (H.). **Sur la nature de la bronchite sanglante. (Fuso-spirochétose bronchique.)**—*C.R. Soc. Biol.* 1922. May 13. Vol. 86. No. 17. pp. 1002–1004.

This paper is of interest, as it is from the pen of the discoverer of the condition known as Vincent's angina, which is associated with the presence of large numbers of spirochaetes and fusiform bacilli in the throat. The author reviews the various records which have been published of the presence of spirochaetes and fusiform bacilli in expectorations from the lungs. He believes, as many of the observers quoted also do, that the lung condition in spirochaetal bronchitis is due to invasion of the bronchi by the same organisms which occur in the pharyngeal condition. *Spirochaeta bronchialis* is identical with *Spirochaeta vincenti*.

C. M. W.

i. BAUR (J.) & CODVELLE. **Note sur un cas de bronchite sanglante à fuso-spirochêtes de Vincent.**—*C.R. Soc. Biol.* 1922. Mar. 25. Vol. 86. No. 12. p. 665.
ii. BECKERICH (A.) & FERRY (G.). **A propos d'un cas de bronchite sanglante de Castellani.**—*Ibid.* May 20. No. 18. pp. 1103–1104.
iii. CHINA MEDICAL JOURNAL. 1922. Jan. Vol. 36. No. 1. pp. 67–69. —**Department of Parasitology. Broncho-spirochaetosis in China. Abstract of Symposium.**

i. In the blood-stained expectoration of a case of muco-purulent bronchitis the author discovered polymorphic spirochaetes, fusiform bacilli and various other bacteria. He considers it impossible to differentiate the spirochaetes from those seen in Vincent's angina.

ii. A case of bronchitis with blood-stained sputum in which spirochaetes and fusiform bacilli were found.

iii. A description of some cases of broncho-spirochaetosis in China. The significant remark is made that the disease may be complicated by other conditions and frequently by tuberculosis. [Would it not be more correct to have stated that tuberculosis and other conditions of the lung may lead to invasion by the spirochaete?]

C. M. W.

ONORATO (Raffaele). **Le spirochetosi broncopolmonari.**—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1920. July–Aug.–Sept. Vol. 1. Nos. 7–8–9. pp. 301–303.
RINCONES (P. Gonzalez). **Un caso de Espiroquetosis de Castellani simulando la tuberculosis pulmonar.**—*Gac. Med. de Caracas.* 1921. Dec. 15. Vol. 28. No. 23. pp. 365–366.
MONTEIRO (José Nascimento de Santana). **Um caso de febre recorrente Indiana.**—*Bol. Ger. Med. e Farmacia.* Bastora. 1921. Mar. & Apr. Ser. 7. Nos. 3–4. pp. 81–83.

INFECTIOUS JAUNDICE.

PARMANAND (M. J.). **The Presence of Infectious Jaundice in Bombay.** —*Indian Med. Gaz.* 1922. Feb. Vol. 57. No. 2. pp. 54–57. With 1 text fig. and 2 charts.

Seven cases of fever associated with jaundice came under the author's notice. One of these at least was of a severe type and clinically left no doubt as to the nature of the illness being Weil's disease. In the deposit from the centrifuged urine of two of the cases spirochaetes were discovered. It is concluded that they were the cause of the disease, but no precautions appear to have been taken to prevent contamination of the urine; nor has the possibility of the occurrence of saprophytic spirochaetes, which not infrequently occur in urine not drawn off by catheter, been considered.

C. M. Wenyon.

WADSWORTH (Augustus), LANGWORTHY (H. Virginia), STEWART (F. Constance), MOORE (Anna C.) & COLEMAN (Marion B.).—**Infectious Jaundice occurring in New York State. Preliminary Report of an Investigation, with Report of a Case of Accidental Infection of the Human Subject with** *Leptospira icterohaemorrhagiae* **from the Rat.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 15. Vol. 78. No. 15. pp. 1120–1121.

During the summer and autumn of 1921 there occurred in New York State about 300 cases of an infectious or epidemic type of jaundice. An investigation of a large number of these did not produce any evidence of their being cases of Weil's disease.

During an investigation of a strain of *Leptospira icterohaemorrhagiae* obtained from rats, one of the laboratory workers became infected and developed a typical attack of Weil's disease. The case was thoroughly investigated and left no doubt as to the diagnosis. The only suggested path of infection is that of a needle prick, which the victim had accidentally inflicted upon herself. This appears to be the first case of unintentional laboratory infection of a human being.

C. M. W.

BEGER (H.). **Beobachtungen bei einer Laboratoriumsinfektion mit "Siebentagefieber."** [A Laboratory Infection with Seven-Day Fever.]—*Arb. a. d. Reichgsndhtsamt.* 1922. Mar. Vol. 53, No. 1. pp. 1–6.

A laboratory worker in Germany became ill with a febrile disease proved to be due to a leptospira which was cultivated from the blood. The culture procedure, which has proved useful for the diagnosis of human cases and infections of experimental animals, is to introduce 3 cc. of blood into test tubes containing sterilized tap water and to incubate at 25° C. In about four days leptospira will be sufficiently numerous to recognize. The laboratory infection was due either to *L. icterohaemorrhagiae* or *L. hebdomadis*, which were then in the laboratory. By inoculation experiments and serological tests it was demonstrated that it was due to the latter organism. Though the leptospira of seven-day fever is not so nearly related to that of Weil's disease as are the various relapsing fever spirochaetes to one another, the author still regards them as races of one species.

C. M. W.

MENDELSON (Ralph W.). *Pseudo-Leptospira icterohaemorrhagiae.—Jl. Trop. Med. & Hyg.* 1922. May 15. Vol. 25. No. 10. pp. 125–126. With 2 text figs

The author records the occurrence of leptospira in 8 of 1,483 rats examined in Siam. As no case of Weil's disease in man is known in this country, it is concluded that the rat organism is distinct from the human one and the name *Pseudo-leptospira icterohaemorrhagiae* is proposed. [This is undoubtedly incorrect, for even if the organism is a distinct species it must be included in the same genus.]

Attempts at cultivating the organism failed entirely. In view of the fact that it is easy to obtain cultures if the right technique is employed, it would appear that the description of the apparatus used by him, which he describes as quite satisfactory though failing to give a culture, is somewhat superfluous.

C. M. W.

i. CARRIEU (M. F.) & SOLLIER (N.). **Présence, à Montpelier, de Rats parasités par** *Spirochaeta icterohemorragiae.—C.R. Soc. Biol.* 1922. May 13. Vol. 86. No. 17. pp. 991–993.

ii. DA SILVA (E. Pereira). **Sur la présence du** *Leptospira icterohaemorrhagiae* **chez les rats d'égout à Lisbonne.**—*Ibid.* pp. 1043–1044.

iii. KASAI (Katsuya). [**On** *Spirochaeta icterohaemorrhagiae* **Inada which has been found in the Mouse.**]—*Chuwo Juikwai Zasshi* (*Jl. Central Vet. Soc.*). 1921. July. Vol. 34. No. 7. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 16.]

i. A record of the natural occurrence of *Leptospira icterohaemorrhagiae* in rats.

ii. The title of the note sufficiently indicates its contents.

iii. Having discovered an organism resembling that causing Weil's disease in a mouse, its identity with *Leptospira icterohaemorrhagiae* was established by inoculation experiments in guinea-pigs.

C. M. W.

YELLOW FEVER.

NOGUCHI (Hideyo). **Researches on Yellow Fever. Comparative Aetiological, Pathological, and Epidemiological Considerations; Prevention and Treatment.** — *Lancet.* 1922. June 17. pp. 1185–1190. With 3 plates.

This is an interesting and important paper which reviews much of the work done by the author and others on yellow fever. Of special significance are the remarks made about the diagnosis of the disease and the difficulty of distinguishing it from certain severe forms of Weil's disease.

After a historical summary the investigations which led to the isolation of *Leptospira icteroides* in Guayaquil are described, as well as the confirmatory work of the author and KLIGLER in Mérida (Yucatan) and Northern Peru. These results were repeated by GASTIABURU, PEREZ-GROVAS, LE BLANC and IGLESIAS in other localities. The author himself had succeeded in transmitting *Leptospira icteroides* from guinea-pig to guinea-pig by *Stegomyia fasciata.* This experiment has been repeated by IGLESIAS, who succeeded in transmitting the organism once 23 days and once 31 days after the mosquitoes had fed on infected blood.

The author considers the failure of earlier investigators to transmit the disease to animals. He thinks that generally speaking no thorough investigations were carried out, though Wolferstan THOMAS (1909–10) undoubtedly gave the disease to chimpanzees and guinea-pigs, and SEIDELIN evidently passed it on in series from one guinea-pig to another without discovering the leptospira.

The important question of the relation of yellow fever to infectious jaundice is discussed. Morphologically the leptospira from these diseases are indistinguishable, as also are that of Japanese seven-day fever, and the forms that occur in stagnant and salt water which have been studied by Miss TILDEN in the United States. The pathogenic leptospira are, however, by no means identical, as can be proved by their immunological and pathological properties. *L. icteroides* is predominately *icteronephritic* with a marked tendency to produce fatty degeneration of the parenchymatous cells of the liver and kidney; the haemorrhage in mucous membranes is more pronounced in experimental infections with *L. icteroides* than those resulting from *L. icterohaemorrhagiae.* In the case of *L. hebdomadis* the tendency to produce jaundice is very slight and may be entirely absent. These differences in experimental animals are largely matters of degree and this is true of the diseases in human beings. Typical cases of yellow fever are not readily confused with infectious jaundice, but cases of the latter with "black vomit," jaundice, nephritis, nervous symptoms, relative brachycardia cannot be differentiated clinically from yellow fever of similar severity. In such cases of infectious jaundice the boxwood liver of yellow fever may be found at autopsy. Furthermore, the black vomit and boxwood liver may both be absent in yellow fever. The two diseases are essentially similar though caused by two distinct species of the genus *Leptospira,* just as syphilis, yaws and venereal disease of rabbits are three diseases caused by three morphologically indistinguishable species of the genus *Treponema.*

Fatty degeneration of the liver and kidneys, both in human beings and experimental animals, is a characteristic feature of infection with *L. icteroides*. It is much less marked in the case of those produced by *L. icterohaemorrhagiae*. A series of photographs of the microscopical appearance of sections of the liver and kidneys in yellow fever, infectious jaundice, acute yellow atrophy and phosphorus poisoning illustrate the changes in these organs.

The passage of the virus of yellow fever through dogs in series results in a gradual loss of virulence. The fact that guinea-pigs, puppies and marmosets can be inoculated with *L. icteroides* does not in any way modify the present day conception of the epidemiology of yellow fever. These animals can only be infected with difficulty under the most favourable conditions when relatively enormous quantities of virus are injected. In nature such massive doses are never injected. Under the circumstances these animals can hardly become reservoirs of yellow fever infection.

Reference is made to the results so far obtained in the use of leptospira vaccine as a prophylactic in yellow fever. Its application in Guayaquil has already been referred to [this *Bulletin*, Vol. 18, p. 249]. About 10,000 non-immunes were injected and of those which received two doses of 2 cc. of vaccine none contracted the disease, while a few of those who received a single injection became infected later. The comparison of these figures with those which were obtained amongst the unprotected was so striking that the protective value of the vaccine seems conclusively proved. It also appeared that protection was not manifest till 10 or 15 days had elapsed after the the last injection. A striking instance is quoted from Peru. Fifty non-immune soldiers were stationed in villages where yellow fever was at its height. Of these 25 were vaccinated. Of the unvaccinated, 20 contracted the disease, but none of the 25 vaccinated came down. Two other cases are mentioned in which 200 and 600 vaccinated soldiers stationed in yellow fever areas mixed intimately with the population without a single one of them contracting the disease. In British Honduras yellow fever broke out in St. John's College where nine cases occurred amongst 146 students. The entire college population was vaccinated; seven more cases occurred within 14 days, after which the outbreak ceased.

As regards the curative properties of the immune horse serum the author has record of 187 cases treated. Of 107 cases treated before or on the third day of the disease only 14 have died. On the other hand, the mortality among those treated after the fourth day has been nearly as high as in the case of those which have had no serum treatment. Early serum treatment appears to have reduced the mortality from 52 to 13 per cent. The beneficial effect of the serum is seen not only in the lowering of the death-rate, but in the rapid alleviation of both subjective and objective symptoms.

C. M. Wenyon.

HOFFMANN (W. H.). **Ueber die Organveränderungen bei der experimentellen Infektion mit** *Leptospira icteroides*. [Histological Changes in Experimental Infection with *Leptospira icteroides*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 3. pp. 65–68.

From a study of the histological changes which occur in guinea-pigs infected with *Leptospira icterohaemorrhagiae* the author is struck by their resemblance to the changes which occur in the human tissues in Weil's disease, and their dissimilarity from those found in yellow fever in man. As NOGUCHI's organism, *Leptospira icteroides*, produces in guinea-pigs changes like those of Weil's disease, he feels that the last word has not yet been said about the etiology of yellow fever.

C. M. W.

HOFFMANN (W. H.). **Los cambios histológicos en las infecciones experimentales con** *Leptospira icteroides* **y** *Leptospira icterohaemorrhdgiae*. [The Histological Changes in Experimental Infection with *Leptospira icteroides* and *L. icterohaemorrhagiae*.]—Reprinted from *San. y Benefic. Bol. Ofic.* 1921. Nov. Vol. 26. No. 5. pp. 301–304.

The author examined in detail 300 guinea-pigs which he had infected with *L. icteroides* obtained from a yellow fever patient in Merida. He also made cultivations of *L. icterohaemorrhagiae* obtained from rats in Havana and transmitted this through several generations of guinea-pigs.

The clinical symptoms produced and the pathological findings, both naked-eye and microscopical, which are described in detail, were identical in each case, but were not those recognized as occurring in yellow fever; they corresponded completely with what is met with in human cases of Weil's disease.

The paper describes fully the changes produced in the blood, liver, spleen, lymphatic glands, kidneys, suprarenals, testicles, uterus, ovaries, tubes, bladder, stomach, intestines, pancreas, lungs and muscles.

There is no need to detail here the various findings in these tissues and organs, but the main points on which the author lays stress are the following:—In no instance was blood present in the stomach; the blood changes were essentially different from what is found in yellow fever patients; the tissues of the infected animals showed such alterations as correspond with a haemorrhagic septicaemia, for example, the marked hyaline degeneration of voluntary muscle and myocardium, the periodic leucocytoses, rapid and severe destruction of erythrocytes, phagocytosis of them in the spleen and lymphatic glands, conditions not mentioned as occurring in yellow fever patients. Also the liver in no instance showed the condition common in this disease; to the naked-eye it appeared congested and somewhat bile-stained, while, microscopically, the structure was well maintained and the cell-nuclei stained well; there was a slight degree of cloudy degeneration and some droplets of fat were seen also with Sudan staining; there were small haemorrhages between the cells, and usually an infiltration of lymphocytes along the interacinar vessels.

The author does not give a summary of his paper, but the main points on which he appears to insist are:—(1) That the only means of distinguishing between *L. icteroides* and *L. icterohaemorrhagiae* are by immunological reactions, and that these are not absolutely distinctive. (2) That the conditions produced by infection of guinea-pigs with these organisms proved, both macroscopically and microscopically, to be indistinguishable the one from the other. (3) That the changes set up are those found in human cases of infectious jaundice (Weil's disease). (4) That in no instance were the findings such as those which are regarded as typical of yellow fever in man. (5) That he, together with others (including GUITERAS, who is specially named), is therefore sceptical as to the etiological significance of *Leptospira icteroides* in yellow fever.

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HOFFMANN (W. H.). **Los cambios histológicos en las infecciones experimentales con** *Leptospira icteroides* **y** *Leptospira icterohaemorrhágiae*. [The Histological Changes in Experimental Infection with *Leptospira icteroides* and *L. icterohaemorrhagiae*.]—Reprinted from *San. y Benefic. Bol. Ofic.* 1921. Nov. Vol. 26. No. 5. pp. 301–304.

The author examined in detail 300 guinea-pigs which he had infected with *L. icteroides* obtained from a yellow fever patient in Merida. He also made cultivations of *L. icterohaemorrhagiae* obtained from rats in Havana and transmitted this through several generations of guinea-pigs.

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[A large number of animals were inoculated and careful, extensive and detailed histological examination was made of a considerable proportion of them, and the results were submitted to a meeting at which medical men well acquainted with yellow fever were present. If, therefore, these facts are confirmed, we may look for further communications on the question with expectant interest.]

H. Harold Scott.

MUÑOZ OCHOA (Miguel). **Tratamiento y Profilixia de la Fiebre Amarilla en Guatemala.** [The Treatment and Prophylaxis of Yellow Fever in Guatemala.]—Guatemala. 1921. Aug. 47 pp. With 3 text figs.

This thesis is divided into three parts, the first dealing with the pathology, the second with the treatment, and the third with the prophylaxis of yellow fever.

The first part begins with a brief history of the discovery of the *Leptospira icteroides*. The report of a case follows with a description in detail of the results of inoculation of guinea-pigs with the blood of the patient and with cultures of the organism on semi-solid medium (Ringer's solution, human serum and agar). Accounts are given of the autopsies of these animals and of others inoculated from them. In the latter the organism was found in greater numbers than in the former. The lesions produced were the same as those set up by *L. icterohaemorrhagiae* [as was remarked by HOFFMANN in Cuba], but it was found that animals which had been infected with *L. icteroides* were immune to further inoculation with the same, but could be infected, sometimes severely and fatally, with *L. icterohaemorrhagiae*. It would seem, therefore, that the organisms, though related, are not identical. The former appeared to produce icterus and nephritis, the latter haemorrhages and nephritis in experimental animals.

The serum of recovered cases proved to possess both preventive and curative properties. Positive results were obtained by cultivation in three out of eleven cases.

A brief account of the symptoms and diagnosis is also contained in this section.

The second part, on the treatment of the disease, is very interesting. Polyvalent serum administered during the incubation period was found to abort the disease ; if given in the early stages the fatal issue was averted ; even in the later stages of jaundice and nephritis a distinctly beneficial effect was noticed. The serum is prepared by injecting horses with increasing doses (20 rising to 200 cc.) of living cultures of the leptospira. In 65 days a total of 2½ litres was injected. It is administered either subcutaneously or intramuscularly (more for prophylactic purposes), or intravenously (for actual cases). Two cc. is used for prophylaxis and 20 to 50 cc. for treatment according to the severity and stage of the disease.

Good results were reported from its use in El Salvador. Of four inoculated on the second day of illness all recovered ; out of 12 on the third day there were nine recoveries ; 13 out of 21 inoculated on the fourth day, and 15 out of 25 on the fifth day recovered. Amongst 37 injected within the first four days of disease there were 11 deaths.

Though salvarsan and neosalvarsan were found to kill the leptospira *in vitro*, neither had curative or preventive effects in man.

Part three, prophylaxis, is divided into what the author designates as the "permanent campaign" in normal (inter-epidemic) times and the "epidemic campaign" when the disease is actually in being. In this section an account is given of the stegomyia and its habits. Among the special points requiring attention in inter-epidemic periods are continuous water supply, the extermination of mosquitoes, control of immigration, and the organization of a body of inspectors. Propaganda by leaflets and instruction in schools are also mentioned. Under the second—epidemic campaign—the following points are dealt with :—Notification of all cases, suspicious as well as certain ; isolation of the patient and enforcement of the use of a mosquito net in the early stages of the illness ; destruction of all mosquitoes in the infected house, and enquiry into the patient's recent movements, in order to trace the route by which the disease was introduced. Next, the posting up of notices warning the public as to the way in which yellow fever is contracted, and how they may avoid infection by abstaining from visiting the sick, by not going out at night into the infected quarters. He recommends the appointment of a disinfecting squad for dealing with all the houses in the district, if possible, and placing those living there in a limited quarantine.

Lastly, the advantages of vaccination by killed cultures of the organism are pointed out. The vaccine is sent out in vials of 20 cc. (sufficient for ten persons). Figures are given in support of its efficacy. Thus, at El Salvador in 1919–20, amongst 3,469 inoculated only 10 contracted the disease, and of these 5 terminated fatally (1·4 per 1,000). In Guatemala in 1918 vaccine was not used and over 300 deaths occurred ; two years later 4,000 persons were inoculated and there were only 20 deaths.

When injected subcutaneously there was local inflammation and a slight rise of temperature, but no adverse effects followed when it was injected intramuscularly and distributed by gentle massage.

H. Harold Scott.

VERGNE (Eduardo). **A propósito de la fiebre amarilla y de los estragos producidos en las tropas de guarnición en el Departamento de Lambayeque.** [The Ravages of Yellow Fever among the Garrison in Lambayeque.]—*Cronica Med.* Lima. 1921. Oct. Vol. 38. No. 700. pp. 309–321.

On January 29, 1921, three officers, and 49 soldiers arrived at Ferreñafe. They had no nets or any protection against mosquitoes. On the fourth day after their arrival two men fell ill with yellow fever and four more on the following day. Between that date (Feb. 2nd) and the 8th nine more were attacked, and by the 22nd there were 25 patients in hospital with this disease, that is half of the newly arrived garrison. There were eight deaths.

A cordon was instituted to prevent anyone leaving the locality without a signed pass ; others were detailed as inspectors to examine houses for stegomyia and water receptacles for their larvae, and if during their inspection they came across any suspicious case this was reported at once to the doctor and steps were taken to deal with it.

The above facts are made the text for a brief discourse on yellow fever in general, its history, epidemiology, and symptomatology. The description is accurate, but does not contain anything not mentioned in the text-books.

H. Harold Scott.

QUIROS (Manuel) **Demostración de la via que ha seguido la fiebre amarilla al invadir el norte del Perú.** [The Route taken by Yellow Fever in invading Northern Peru.]—*Cronica Med.* Lima. 1921. Dec. Vol. 38. No. 702. pp. 381–401.

The author deals first with the question as to whether yellow fever is endemic in Tumbez (where the first case occurred in the epidemic of October, 1918, to April, 1919), and concludes that it was introduced from Guayaquil. There had apparently been a small outbreak in 1893 following a recrudescence in Guayaquil the previous year.

The earlier cases of the 1918 outbreak were diagnosed as " Influenza," but the symptoms included marked jaundice, haemorrhages and black vomit. Some of the later cases were designated " uraemia," " septicaemic plague," " typho-malaria."

The first case was an itinerant vendor who was taken ill at Santa Rosa (he had come from Guayaquil, it appears) and died at Tumbez. The route of spread of the cases is given in detail.

H. Harold Scott.

CARTER (H. R.). **Yellow Fever in Peru. Epidemic of 1919 and 1920.** —*Amer. Jl. Trop. Med.* Baltimore. 1922. Mar. Vol. 2. No. 2. pp. 87–106.

It was shown by the Rockefeller Foundation that Guayaquil was the key to the West Coast of South America as far as yellow fever was concerned. The present paper describes the campaign in the coast towns of N. Peru with a view to the elimination of the disease which was introduced from Guayaquil. By the adoption of the usual measures an entirely successful result was obtained in the northern department, the last cases of suspected yellow fever occurring in September, 1919. The work which is still in progress should free the entire Pacific coast of South America from yellow fever.

C. M. W.

HENRIC & LAMOUREUX. **Un cas de fièvre jaune à la Martinique.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 179–181.

During June and July, 1919, there occurred in Martinique several cases of an acute febrile disease which produced great prostration and albuminuria. All the cases recovered in about five days. In January, 1921, there occurred a case which presented all the clinical features of yellow fever, and the authors of the paper had no hesitation in diagnosing this condition. The patient died, but no autopsy was performed.

C. M. W.

SPIRE. **Historique des différentes épidémies de fièvre jaune au Dahomey.** —*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. July–Aug.–Sept. Vol. 19. No. 3. pp. 335–345.

Yellow fever has never been officially recorded as occurring in Dahomey previous to 1905, but a study of the official record convinces the author that prior to this date the disease was actually present, but was called bilious haemoglobinuric fever. He traces the various outbreaks which have occurred. There was an epidemic (13 cases) in the first half of 1905. It died down but reappeared early in 1906

(12 cases). In 1907 there was a single case, while from 1908–10, though the disease occurred in other parts of W. Africa, Dahomey was free. There were two cases in 1911 and eight in 1912. The last outbreak occurred in 1913 with six cases.

It is concluded that there are two foci of the disease in Togo, one at Lomé and the other at Anécho. In Dahomey there are three foci, at Agoué, Grand-Popo and Ouidah.

C. M. W.

HOFFMANN (W. H.). **Das Gelbfieber in Westafrika.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 10. pp. 291–294.

The paper is a criticism of the conclusions arrived at by the commission which went to W. Africa under NOBLE to report on yellow fever, some details of which have been given by GUITERAS in Havana. The statistical methods which amongst the mixed population of America serve to reveal past epidemics of yellow fever are not applicable to W. Africa. GUITERAS has shown that when yellow fever is prevalent in any locality in America the mortality rate for white children rises considerably above that for other types. Because no such marked rise was noted in W. African figures it is concluded that no trace of yellow fever could be found. The writer of the article maintains that the two countries are not comparable, as in W. Africa the white children form but a very small percentage of all the children. He agrees that it is very probably as GUITERAS maintains—that yellow fever in W. Africa has already ceased to exist.

C. M. W.

SEIDELIN (H.). **Notes sur la prophylaxie et le traitement de la fièvre jaune au Congo.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 231–233.

A short account of the measures adopted to check the outbreak of yellow fever at Matadi in October, 1917. It is supposed that the epidemic was due to the introduction of infected mosquitoes by a ship, though there was no evidence that any cases of the disease had occurred on board.

C. M. W.

i. LEMAIRE (Neveu). **Les grandes endémo-épidémies intercoloniales.** [Yellow Fever.]—*Presse Méd.* 1922. May 3. Vol. 30. No. 35. pp. 721–727. With 2 figs. and 2 maps in text.

ii. OLPP. **Spezifische Therapie und Prophylaxe des Gelbfiebers.**—*Münch. Med. Woch.* 1922. Mar. 3. Vol. 69. No. 9. p. 311.

i. A general description of yellow fever and its distribution, with remarks on the possibility of its extension as a result of the Panama Canal.

ii. A note on the results which have been obtained by others with NOGUCHI's prophylactic vaccine of the yellow fever organism and the curative serum. These have already been noted in the *Bulletin.*

C. M. W.

CAVASSA (Nicolás E.). **La fiebre amarilla en la provincia de Pacasmayo.** *Cronica Med.* Lima. 1921. Dec. Vol. 38. No. 702. pp. 401–408.

NOGUCHI (Hideyo). **Profilaxis y seroterapia de la fiebre amarilla.**—*Repert de Med. y Cirug.* 1921. Dec. Vol. 13. No. 3. (No. 147.) pp. 118–134.

MALARIA.

Bulletin de la Société de Pathologie Exotique. 1922. Mar. 8. Vol. 15. No. 3. pp. 150-153.—**Rapport de la Commission du Paludisme. Commission désignée à la séance de novembre et composée de MM. Marchoux, président; Broquet, Brumpt, G. Martin, Roubaud, membres; Edmond Sergent et J. Rieux, rapporteurs.**

The weight which attaches to the names of these Commissioners justifies, or necessitates, a rather full summary of their findings, which may probably be fairly abstracted thus, and are reproduced without comment:—

Malaria is caused by a Plasmodium parasitizing the erythrocytes and not present in any other cell unless ingested by phagocytosis. Mature "gametes" remain permanently enclosed in erythrocytes deprived of their haemoglobin. These are not immortal; a certain number regenerate by parthenogenetic division into schizonts. The erythrocyte's haemoglobin is transformed by the parasite into melanin, which is broadcasted by the erythrocyte's disintegration during the parasite's sporulation. The pigment is absorbed by phagocytes and fixed in the connective tissue, thus producing the malarial tint and the "pseudosclerosis" of perivisceral or intravisceral connective tissue, with resultant enlargement of liver and spleen. Multiplication of parasites can be considerable enough to produce, especially in malignant tertian malaria, overcrowding of the fine capillaries and arrest therein of the infested erythrocytes. This arrest is followed by capillary or more extensive haemorrhage, which may leave definite lesions.

Relapses are due, according to Grassi & Schaudinn, to parthenogenesis of macrogametes; according to Ross, to sparse persistence of schizonts. In general, freedom from evidence of clinical infestation for 8–10 months means disinfestation. There persists a relative immunity particularly for the race of parasite concerned. Exceptionally, relapses, clinical and parasitic, may reappear after several years' apparent cure. Chronic malaria consists of poikilocytic, anaemic, cachexia with its essential concomitants (often without notable fever) in those subject to relapses or reinfections. Excessive formation of fibrous tissue in spleen and liver causes their enlargement. There is no evidence that these organic lesions are progressive. In repatriated malarial infections evidence of infestation nearly always ceases to be obtainable after 12 to 15 months' residence in France. Such cases may be permitted to return to the colonies if they have been free from all evidence of infestation for 18 months from any January, if their general condition be good, if they have no anaemia or splenomegaly, if their leucocytic count be normal; provided that they exercise rigorous precautions and have never had haemoglobinuria.

Clayton Lane.

McLay (Kenneth). **Malaria in Macedonia, 1915-1919. Part III. Haematological Investigations on Malaria in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1922. Feb. Vol. 38. No. 2. pp. 93–105. With 1 plate and 3 charts in text.

Of 1,136 cases of malaria microscopically diagnosed as such either in the special wards of the Fifty Second General Hospital or before admission, 562 never gave evidence of malaria while in hospital. Of 586 cases whose blood was examined on the day of admission, only 23 or 3·9 per cent. were positive. Of cases at some time proving positive 462 were infestations by *Plasmodium vivax,* 100 certainly or probably by *P. falciparum,* 9 were mixed infections by both forms, while in 33 the species was doubtful.

Comparing the effects of 60 gr. of quinine hydrochloride by mouth with the same weight of quinine bihydrochloride intramuscularly or subcutaneously, the number of cases being 60, 60 and 9 respectively, it was found that blood films became negative earlier with oral than with either of the other two routes of administration. This observation is compared with Captain T. S. HELE's findings that there is a more rapid excretion of quinine in the urine after oral administration on a healthy stomach than after intramuscular administration. In 55 per cent. of the intramuscular cases there was a rise of temperature to at least 100° F., with leucocytosis. A similar leucocytosis following injection of antipyrin is similarly attributed to local trauma. No evidence of fragility of erythrocytes was found in nine cases investigated. It was noted that, as usual, sporulation was not limited to the period of the rigor.

C. L.

EUGLING (Max). **Ueber Malariabekämpfung: Beobachtungen und Untersuchungen aus dem albanischen Malaria-Gebiet.** [Antimalaria Measures: Observations and Researches in Albania.]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. Beihefte 1. pp. 5-63.

The interest of war-time malaria in Albania will lie largely in its correlation with the conditions already described so fully for Macedonia [this *Bulletin,* Vol. 19, p. 277, etc.]. Yet this paper contains close observations of wider interest. Since from 160 to 180 per cent. of the normal strength was at one time down with malaria, cadres had on that account to be greatly increased. Indeed, it is calculated that in Albania 100,000 men contracted malaria. Of 10,411 positive examinations at the Alessio Field Laboratory, 8,163 or 78·4 per cent. were subtertian, 2,173 or 20·9 per cent. tertian, 18 or 0·16 per cent. quartan, while only 57 or 0·54 per cent. were diagnosed as of mixed or doubtful infestation.

The problem of prevention was attacked in four ways. (1) An antimosquito campaign. Since it is calculated that every anopheles female which survives the winter produces during the ensuing year seven and a half million descendants, the urgent necessity of destroying all hibernating mosquitoes is stressed, as being far easier and cheaper than is a summer campaign. In thatched houses hibernation took place actually within the hollow stalks of individual straws. Many certainly were vacant, but as many as 16 anopheles were found within a single straw. Roof beams and cobwebs were also favourite resting places. Means of destruction used were flaming by a benzine blow pipe, not of course in a thatched roof,.tobacco and pyrethrum smoke, and spraying. It is significant that for the last case soapy were far more effective than soap-free solutions, and the blockade effected markedly the efficiency of this aspect of antimalarial work. Mosquitoes which survived the winter laid about 250 or 300 eggs about the beginning of June, and then died within a few hours or days; whereas females of the new brood, if maturing in August, laid 150 to 200 eggs; if in September or October, about 50 eggs, and did not thereafter die. If mud were taken in winter from summer breeding pools and kept warm in water, freshly hatched larvae appeared in about three weeks, so that apparently eggs may survive winter. Although larvae lived for months under a layer of ice they were not observed surviving the winter in nature. Pupae are not mentioned. The summer temperature of shallow pools sufficed to kill larvae. Bats did not feed upon mosquitoes. Anopheline gluttony was such that the female filled herself with five times her own weight of blood, and as she preferred her meal in several courses, served generally by different persons, the chances of malarial dissemination were correspondingly increased. (2) Mechanical prevention of contact between man and mosquito is considered. (3) It is advised that quinine, for which neosalvarsan is no substitute, should be given prophylactically in 1 gm. doses on Wednesday and Saturday, and in a ½ gm. dose on Sunday. (4) Finally, separation of infected and non-infected, by the evacuation of one or the other, is dealt with.

C. L.

MARANTONIO (Roberto). **La tubercolosi e la malaria nella R. Marina durante il quinquennio 1915-1919.**—*Ann. di Med. Nav. e Colon.* 1922. Year 28. Vol. 1. No. 1–2. pp. 27–42.

Malaria was prevalent in the Italian Royal Navy during the war. It is dealt with under the headings of new cases and relapses, terms which, however, actually signify the first and subsequent entries on the official medical history sheet. Cases are also divided into the clinically light and the clinically grave. Microscopic diagnosis is not entertained. The percentage of the force requiring treatment between 1914 and 1918 increased nearly five-fold. Official prophylaxis, of which details are omitted, is nevertheless claimed to have achieved a veritable sanitary victory.

C. L.

McDONALD (W. M.). **The Parasitology and Clinical Aspects of Malaria in Antigua.**—*Brit. Med. Jl.* 1922. Apr. 15. pp. 597–599.

Of 300 positive blood films, 61 per cent. showed *Plasmodium falciparum*, a third of them with crescents; 28 per cent. *P. malariae* and 11 per cent. *P. vivax*. The statement of PRATT-JOHNSON and GILCHRIST [this *Bulletin*, Vol. 17, p. 302] that crescents are not found in the untreated or in acute cases of the disease, is, as was to be expected, traversed, the writer's crescent-containing cases being all untreated or at least such as had not been recently treated. Grave effects of malignant tertian infection are, in Antigua, apparently limited to children. The treatment recommended consists of an initial dose of calomel or salts, and 30–45 gr. of quinine daily, under which clinical cure is rapid; but subsequent persistence in the treatment is unheard of.

C. L.

SCHÜFFNER (W.) & HYLKEMA (B.). **Malaria in Belawan during the Construction of the Ocean-Harbour.**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1922. (Foreign Edition). Pt. 1. pp. 47–79. With 19 illustrations, 7 charts and 1 map.

This work does not fall from the high standard which one has learnt to associate with the Dutch East Indies. It will be a revelation to many to realize that the virgin mangrove forest does not there harbour malaria, but that as soon as clearance began conditions were set up favourable to breeding of *Myzomyia ludlowi*, the main malarial definitive host in this region. There was obtained, moreover, as urged by SWELLENGREBEL [this *Bulletin*, Vol. 17, p. 130], definite evidence of "breeding-place-deviation," the female ovipositing under quite different natural conditions, since these presumably suited her changed fancy or convenience. The percentage of mosquitoes infested was very high, 20 to 30 being recorded, and with this high degree of infection the extent of individual infestation was also high. One learns with regret that the auto-inoculation experiments of Dr. and Mrs. SWELLENGREBEL [this *Bulletin*, Vol. 16, p. 308] have run a serious course; it is suggested in the paper that this may have been due to the original receipt of a heavy infection. Some interesting work upon the effect on the mosquito of malarial infestation was recorded. Thus, while it was comparatively easy to find early infections among them, those with late infections were much rarer, presumably because the infestation induces a considerable mortality.

Systematic captures of mosquitoes were made, and it is significant that it was to the interior of mosquito nets, imperfectly repaired or improperly adjusted, but in any case supplied by the coolies themselves as a protection against the plague of Culicines, that the writers looked for the supply of many of their catches, so much so that they have a reasonable grievance against the "free" chinese coolie for smashing up the mosquitoes which his net, baited by his own body, had trapped. BASS's "bow-net" mosquito traps are described and illustrated, and were applied to stables with astonishingly effective results. It was found, so far as the experiments went, that buffaloes were more attractive to *M. ludlowi* than were cattle, so attractive indeed that "one single buffalo is able to divert the greater part of the ludlowi from the lodgings of 100 people." The antimalarial work was evidently carried out in a spirit of reasonableness, which was probably a considerable factor in its success.

C. L.

SWELLENGREBEL (N. H.). **Fréquence saisonnière des Anophèles impaludés aux environs d'Amsterdam.**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 116–119.

The author, in a series of observations embracing the whole of the year 1921, confirms the proposition that infected individuals of *Anopheles maculipennis* are seldom found in the houses of sufferers from malarial fever during the summer months, but are frequently found there during the winter months. For the year 1921 his tabular monthly record of oocyst-carrying Anopheles found in such houses shows the following figures:—

	Number of insects examined.	Percentage with infected oocysts.
January	251	0·4
February	221	1·3
March	218	1·4
April	124	0·8
May	236	0
June	472	0
July	601	0
August	104	0
September	467	1·3
October	787	6·2
November	637	5·0
December	975	6·1

The author does not say that *Anopheles maculipennis* does not get infected, or does not develop infection, during the summer; his contention is that, since cattle are 33 times more attractive than man to the insect, an infected insect going forth in the summer season to get rid of its eggs is not likely to return to a human habitation; in September, however, the production of eggs ceases, and the insects that have fed in houses stay where they have fed until the egg-laying season comes round again in the early summer following.

The author has further ascertained that there is no hibernation of sporozoites in the salivary glands. He believes, with KORTEWEG, from the facts that the majority of ripe oocysts are found in the October–December months and that the insects are particularly voracious at that time, that the infection is communicated to man during those months, but remains latent in him until spring. And he further concludes, from the fact of young oocysts reappearing in the months February–April, that the infection of the insects during those months is a fresh infection—thus amply confirming the observations of SELLA at Fiumicino. Of course he understands that an abnormally low temperature retards the development of oocysts; but he contends that it is not the temperatures of the meteorologist that have to be considered, but the temperatures of the interior of houses. [The author's conclusions from his observations appear to be, in short, that the maintenance of malarial infection during the winter of the temperate zone is a sort of episodic hot-house modification of the natural process.]

ROUBAUD in his comments on the paper sees a confirmation of his theory of the protective influence of cattle in districts where Anopheles is abundant.

A. Alcock.

i. Ross (Ronald). **Malaria and the Mosquito.** [Correspondence.]—*Lancet.* 1922. Apr. 29. p. 868.
ii. ——. **The Work of Sir Patrick Manson.** [Correspondence.]—*Brit. Med. Jl.* 1922. Apr. 29. p. 698.

i. Ross objects to the statement, published in the *Lancet* of April 15, that Sir Patrick MANSON "was the first to trace the connexion between the mosquito and the malaria parasite." The Editor of the *Lancet* explains and justifies the impugned statement by a quotation from Sir Patrick MANSON's published writings. This quotation shows how, from observed facts in the behaviour of the malaria parasite when removed from the blood vessels, Sir Patrick MANSON saw a clear analogy between the malaria parasite and the filaria parasite, and foresaw that the mosquito must be the liberating agent in the one case as it had been proved to be in the other. This is what the Editor of the *Lancet* meant to imply in the phrase "tracing of the connexion." [It may be added that Ross himself in a paper on "Malaria and Mosquitoes," published in *Nature* for March 29, 1900, pp. 522–527, has referred to Sir Patrick MANSON's foresight in this matter in terms that bear the same implication as that drawn by the Editor of the *Lancet* from another source. Ross states in this paper that "it is to MANSON's study of them" (*i.e.*, the gametocytes) "that we owe the solution of the malaria problem. Numerous observers had examined them before MANSON's time, but all had failed at arriving at a correct idea as to their function."]

ii. Ross here objects to a statement published in the obituary notice of Sir Patrick MANSON (*Brit. Med. Jl.*, April 15, 1922), which suggests that MANSON was the first to establish "the transmission of an agent of disease by intermediary agents," and also to the suggestion that MANSON was the first to suspect the intermediation of mosquitoes in spreading the *Filaria bancrofti* parasite. [The first objection is, of course, valid, and the second also may be so. MANSON's real originality was (1) to have established the fact that an active and *aggressive bloodsucking arthropod* is actually the specific "nurse," or necessary intermediate host, of a specific organism pathogenetic to man; and (2) to have advanced a reasonable argument, namely the synchrony of "filarial periodicity" (a phenomenon first observed by himself) with the hours of mosquito activity for believing the mosquito to stand in the necessary relation of intermediate host to the filaria parasite.]

Ross also states here that MANSON "did not invent the mosquito theory of malaria." [This is true, if the word "theory" is used in a vague colloquial sense; but if it be used in its strict sense, to mean a reasoned proposition capable of proof along a definite line of investigation, then MANSON *was* the originator of the accepted mosquito theory of malaria, as, indeed, Ross himself long ago stated in *Nature* (March 29, 1900, p. 523). There Ross remarks of mosquito-malaria theories other than that of MANSON that they were little more than hypotheses based on arguments that would hardly attract the serious attention of a laboratory worker with a serious end in view, but that "On the other hand MANSON's theory was an *induction*—a chain of reasoning from which it was impossible to escape."]

A. A.

i. CATANEI (A.). **Morphologie des *Plasmodium* dans un accès mortel de paludisme.**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 104–107. With 3 plates.

ii. MARCHOUX (E.). **Multiplicité des races dans les trois formes de parasites du paludisme.**—*Ibid.* 1922. Feb. 8. Vol. 15. No. 2. pp. 108–109.

i. Working under the direction of SERGENT and PARROT, Catanei describes the morphology of Plasmodia seen in blood smears taken during life from a negro of Ouargla, Algerian Sahara, found unconscious in Maison-Canée, near Algiers. He was apparently of about 35 years of age, and was of unknown antecedents. On admission to hospital the spleen was not enlarged, the temperature was 35·9° C. (96·6° F.), the blood almost colourless, and 72 per cent. of the erythrocytes contained Plasmodia. Discrepancies in the figures render uncertain the actual percentages of the different forms of Plasmodium present, but it appears correct to state that about one third of 686 parasites examined and measured fell into one or other of the three generally recognized forms. Atypical forms numbered over a third of the whole, and comprised those bacilliform and amoeboid conditions which have been assigned to *Plasmodium praecox* and *P. vivax*, as well as those which have been described as *P. tenue*, *P. caucasicum* and *P. minutum*. Lastly, forms in process of division into from 2 to 25 Plasmodia, and others which could not be assigned to any hitherto recognized form, comprised rather less than a third of the whole. The conclusions are that ignorance of the man's antecedents renders impossible any conclusion as to the bearing of the case on the specific unity or otherwise of man's malarial parasites, but that in an untreated fatal case of malaria all types of the parasite may present a polymorphism rendering exact diagnosis impossible.

ii. Marchoux contends that all three malarial parasites exhibit different races characterized by a different geographical distribution and a different morphology. Thus, in *Plasmodium falciparum* there are anatomical differences between the parasites contracted in West Africa, Italy and Macedonia. The number of gametocytes is, for instance, so he holds, few in the first—always abundant in the others. Their shape is ovoid in West Africa, crescentic in Italy and Macedonia. Again, the parasites of Madagascar differ slightly from those of West Africa, while the Indo-Chinese type is intermediate between that of Africa and Europe. Indeed, he maintains that parasites from Greece are distinguishable from those of Macedonia, but in none of these cases are the differences put into words.

Again, he is satisfied that *P. vivax* of France differs from that of North Africa, of Cape Verde and of the Amazon, and that *P. malariae* from North Africa is distinguishable from the compact Salonican form, while there is a distinct race on the Amazon. He explains the fact that Senegal negroes, immune to malaria in their own country succumb in Dahomey by this multiplicity of races, and draws analogies with the *Bacillus coli* group of bacteria.

C. L.

PAISSEAU (G.) & LOUBRIEU. **Paludisme autochtone à** *Plasmodium praecox.—Paris Méd.* 1922. Feb. 11. Vol. 12. No. 6. pp. 117–119.

A happy instance of that clear thinking which one likes to associate with France. It is first pointed out that of the 18 recently reported autochthonous cases of infection in France with *Plasmodium praecox* [*P. falciparum*] two have died, and that there is no justification for the suggestion that in temperate climates the infection becomes less grave. The influence of syphilis on autochthonous French infection is emphasized, 40 per cent. of these malarials being so infected, while six of the eight serious cases and one of the deaths occurred in syphilitics. Yet it is pointed out that it is perhaps the arsenobenzol used in the treatment of syphilis and not the syphilis itself which is to blame here, through the drug's action in activating malaria. The writers then pass on to the consideration of the question of the unity or otherwise of the plasmodial species, a question particularly canvassed in France, and put the case thus. It is a matter of common observation that in malarial cases *P. praecox* becomes during the first winter replaced by *P. vivax*. For this two possible explanations are offered; the first that the original infection is double and that the former species first suppresses the latter, but later dies out in its favour; the second that there is one species with different seasonal forms. Now it must be reasonably accepted that in France, where malaria is in any case so rare, the likelihood of an autochthonous case contracting a double infection is logically negligible, so that if, in these autochthonous cases of *P. praecox*, this form becomes replaced in the spring by *P. vivax*, the unity theory would be greatly strengthened. Although these cases have unfortunately not all been followed up, it is yet certain that, in the three of them which have been, *P. praecox* has persisted as such, having been found six times from February to June, during which period it should, were the unity theory correct, have been replaced by *P. vivax*.

C. L.

RIEUX (J.). **Existe-t-il un "paludisme chronique" chez les paludéens définitivement rapatriés en France?**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Feb. 2. Year 38. 3rd Ser. No. 3. pp. 162–167. (Discussion, pp. 167–172.)

Rieux returns to his previously expressed opinions that a malarial infestation reaching a non-malarial area in France in October will show typical symptoms with *Plasmodium praecox* in the blood and febrile attacks reappearing until January. Under quinine treatment tertian or quartan fever with the corresponding parasite will appear in the next February or March and will persist till June, or at the outside July, when the parasites will probably disappear. It is admitted that this disappearance may be delayed for 18 months. These cures are considered to fall into the following category:—Cures without sequelae, 20 per cent.; cures with definite malarial sequelae, such as anaemia or splenomegaly, 20 per cent.; cures with persistent troubles not certainly malarial, 60 per cent., of which gastro-intestinal affections comprise half and cholecystitis a quarter.

In the discussion which followed, the natural cure, in course of time, of all malarias was admitted, but the limitation of that time laid down by the lecturer was not generally allowed.

C. L.

GRANJUX. **Le paludisme chronique.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 4. pp. 100–103.

La Société de Médecine Legale having received from one of its members a communication denying the existence of chronic malaria, and believing this statement to be opposed to general medical opinion, referred the matter to La Société de Médecine et d'Hygiène Tropicales, whose conclusion is that "chronic malaria exists and that, while the finding of the Plasmodium is one of the most important elements in diagnosis, the failure to do so is no evidence of the absence of malaria."

C. L.

MACDONALD (Angus). **A Note on the Physical Estimate of Malaria Disability.**—*Jl. Roy. Army Med. Corps.* 1922. Feb. Vol. 38. No. 2. pp. 131–140.

A careful clinical and haematological examination of 172 men who had been for months—30 per cent. of them for more than 12 months—under treatment at a Command Depot, resulted in the recommendation that 155 were fit to return to their units: "It is contended that there are physical data ready to be obtained sufficient to establish in the case of the soldier his fitness for duty, and in the case of the civilian his fitness for work, apart from the academic question whether he may harbour a few stray parasites in his system." It is felt that the error on the safe side made by many with so little experience of malaria "has been inimical to army interests, to the service of the country at a time of crisis, and as well as to the men themselves, and resulted in the holding up in institutions, in command depots and light duty in their units, of men long fit for duty."

C. L.

FRY (A. B.). **The Role of Cattle in the Epidemiology of Malaria.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. pp. 1–2.

Contrasting the sporozoit rate of about 30 per cent. reported at Wilberforce by ROSS & ANNETT, and that of 25 per cent. at Aro, and of 50 per cent. at Loko Meji, reported by the Royal Society's Commission to Lagos, with the Bengal percentage of 0·2 based on the dissection of many hundreds of mosquitoes, Fry draws attention to the facts and conclusions which he recorded in 1914 in the Second Report on Malaria in Bengal, to the effect that it is difficult to find Anopheles in cookrooms or sleeping apartments of houses in Bengal, whereas in cowsheds they swarm. He refers to Ross's formula for the epidemiology of malaria, namely $b^2\ s\ a\ i\ (1-m)\ m\ p$, where "*a*" is the rate of Anophelines per person, "*b*" the proportion which succeed in biting, "*s*" the proportion becoming infective, "*i*" the proportion of gamete carriers, "*m*" the malaria rate, and "*p*" the population, and points out that the biting factor is given a value far higher than is any other, and that the presence of cattle must certainly influence this factor; SCHÜFFNER having indeed found that certain Anopheline species definitely prefer bullock to man.

C. L.

GIOSEFFI (M.). **Bonifica umana e disinfestione idrica nel risanamento antimalarico.**—*Policlinico.* Sez. Prat. 1922. Apr. 24. Vol. 29. No. 17. pp. 549–550.

Following an antilarval campaign in 1919 [this *Bulletin*, Vol. 19, p. 284], the persistent drought, better feeding, an increase in domestic animals and sedulous administration of quinine, amounting in the mean to 69 gm. per head annually, the numbers of malarial cases microscopically diagnosed were reduced in the experimental area from 200 in 1918 to 98 in 1919, 86 in 1920 and 16 in 1921. The enthusiastic local schoolmaster fitted out his pupils, boys and girls, with butterfly nets. They relieved the stables of 450 Anopheles, of which three proved infected, but the antagonism of certain persons to this official, an antagonism which seems to have checked his contemplated campaign, is perhaps evidence that the boys, at least, did not limit their depredations to mosquitoes.

C. L.

SAINTON (P.), RICHET (Ch.) fils & SCHULMANN (E.). **Etat clinique et pathogénique de certains oedèmes palustres.—L'oedème palustre inflammatoire.**—*Ann. de Méd.* 1922. Feb. Vol. 11. No. 2. pp. 128–142. With 3 text figs.

Eliminating instances in which there is any evidence of a cardiac or renal causation, the writers draw attention to sudden oedemas and effusions into serous sacs, which may add at least as much as 5 kilos to the body weight. Such a condition affecting the glottis may be rapidly fatal. These effusions occur in subjects proved by microscopic examination of the blood or of an effusion to be malarial, and they clear up rapidly under quinine. Intravenous administration of the drug is advised under these circumstances, advice with which few will probably disagree. Yet the finding of the vein will perhaps not be such an easy matter.

C. L.

TAIT (John). **"Marrow Pains" in Malaria and in Certain Other Acute Fevers.**—*Canadian Med. Assoc. Jl.* 1922. Mar. Vol. 12. No. 3. pp. 134–136.

This is "an attempt with limited pathological knowledge and restricted clinical experience to handle a clinical problem from a point of view originally suggested by experimental laboratory findings." The experimental findings are these. If Indian ink, suspended in saline, be injected into a rabbit's vein, there will be within an hour a complete disappearance of the fine black granules from the circulation. These are found ingested in endothelial cells lining the capillaries or sinusoids of the liver, spleen and bone marrow, and to a certain extent plugging mechanically the capillaries of the lung and kidney. It is suggested that the malarial pigment, similarly collected by the endothelial cells of the red marrow, produces the symmetrically distributed pains occurring fairly severely during a malarial paroxysm. The manner in which millions of particles are thus removed from the circulation by endothelial cells serves also to throw light on the difficulty in recovering from the blood organisms which are being transported by it in enormous numbers in septicaemia and in typhoid.

C. L.

PENNATO (P.). **Sulla malaria congenita.**—*Riv. Crit. di Clin. Med.* 1921. Mar. 15. Vol. 22. No. 8. pp. 85–88. With 1 text fig.

The writer, investigating the problem as to why malaria sometimes is and sometimes is not transmitted to the offspring of infected mothers, suggests that it is upon the indemnity of the placenta that the fate of the foetus depends. The protective action of the placenta has been shown in respect to other poisons, as in a work by Ugo SOLI reporting the protection of the foetus from acute mercury poisoning which was fatal to the mother. This protective action might fail from various causes, *e.g.*, the intensity and duration of the infection. It is to be remembered that the placental transmission of syphilis does not take place if the infection is contracted by the mother in the last two months of pregnancy. The writer recalls a previously published note on a necropsy of a pregnant malaric aged 40 and the five months' foetus. The florid viscera of the latter contrasted markedly with the great anaemia of the maternal organs. No sign of malaria was found in the foetus. Our knowledge of the functions of the placenta is not yet sufficient to warrant any dogmatic conclusions.

[The protective action of the placenta, from both maternal and foetal points of view, is strikingly illustrated by CLARK [this *Bulletin*, Vol. 7, p. 15]. It appears on the maternal side to be an optimum habitat for segmenting forms of *P. falciparum*, so that by its expulsion the mother is rid of numbers of them, while at the same time it rarely permits their passage to the foetus and then possibly only after traumatism.—C. L.]

J. Rosslyn Earp.

JOHNSON (R. E. Ingram). **Dengue v. Malaria.**—*Jl. Trop. Med. & Hyg.* 1922. May 1. Vol. 25. No. 9. pp. 111–112.

There are here detailed a number of cases in which an attack of dengue has been followed, either by the cure of an existing malaria, or by failure on the part of the person concerned to become infected under conditions in which there is every reason to believe that the Plasmodium has been transmitted. The writer has accordingly become convinced that the sufferer from dengue has become immune from malaria, a point on which there must be available a mass of evidence.

C. L.

GERSTMANN (Josef). **Ueber die Einwirkung der Malaria tertiana auf die progressive Paralyse. II. Mitteilung.** [The Effect of Tertian Malaria on General Paralysis.]—*Ztschr. f. d. Gesamte Neurologie u. Psychiatrie.* 1922. Vol. 74. No. 1–3. pp. 242-258.

One hundred and sixteen cases of general paralysis were treated by induction of malaria through hypodermic injections of blood containing tertian parasites [*P. vivax*] [this *Bulletin*, Vol. 19, p. 298]. Of these, 38 were unimproved, the illness remaining stationary in 19, dementia becoming complete in 7, death occurring in 12. Of the 78 remaining cases 42 recovered completely, that is to say have returned to their ordinary avocations for a period varying between a few months and two and a half years; while in 36 improvement, not amounting to complete recovery, ensued. Individual prognosis under this treatment is considered with diffidence.

C. L.

KOGERER (Heinrich). **Ueber die Probe mit Natrium nucleinicum bei der Malariabehandlung der Paralytiker.** [The Nucleinate of Soda Test in the Malarial Treatment of Paralytics.]—*Wien Klin. Woch.* 1922. Apr. 13. Vol. 35. No. 15. p. 342.

Mainly in the cases of deliberate malarial inoculations used in the treatment of the paralytic an injection of 0·5 gm. of nucleinate of soda was tried. The effects were believed to be so satisfactory in the 25 cases in which it was used that it has now become the standard line of treatment in the clinic. It is admitted that these inoculation cases have been of exceptionally mild type.

C. L.

CHAUFFARD (A.), HUBER (J.) & CLÉMENT (R.). **Paludisme chronique compliqué d'addisonisme, d'atrophie papillaire unilatérale et de polynévrite périphérique.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 117-124.

The appearance of Addison's disease and of nervous symptoms, namely right optic atrophy with pain and wasting in the left limbs but without loss of sensation or deep reflexes, occurring in the absence of a positive Wassermann reaction, "appear to be attributable solely to chronic malaria. . . . Radiological examination was completed by the study of the suprarenal by Carelli's method (insufflation of the perirenal sheath) carried out on the left side only, which showed a small suprarenal and the existence of fibrous adhesions."

C. L.

CARDARELLI (Aldo). **Sindrome meningitica nella terzana primaverile.** [Meningitic Syndrome in Vernal Tertian Malaria.]—*Giorn. di Med. Milit.* 1921. Dec. Vol. 69. No. 12. pp. 623–624.

A case of fever with opisthotonos but full consciousness was diagnosed as cerebro-spinal meningitis until a normal thecal fluid led to investigation of the blood, with the discovery of benign tertian parasites, the remains of an infection obtained on the Piave front a year earlier. His symptoms disappeared rapidly under quinine.

C. L.

BARABASCHI (Paolo). **Di alcune complicazioni gravi della malaria.** [Some Grave Complications of Malaria.]—*Gaz. d. Ospedali e d. Clin.* 1922. Feb. 19. Vol. 43. No. 15. pp. 171–172.

About the Adriatic the Great War brought to the writer's notice three grave forms of malaria: (1) a Macedonian and Albanian with haemolysis, icterus and an enormous and persistent splenomegaly; (2) a grave anaemia leading on to gastric ulcer, with all its symptoms and risks; (3) the lighting up of a pre-existent thoracic tuberculosis.

C. L.

GUTHRIE (J. Birney). **Malarial Infection as a Possible Cause of Symmetric Gangrene of the Extremities with Report of a Case.**—*New Orleans Med. & Surg. Jl.* 1922. Mar. Vol. 74. No. 9. pp. 604–612.

A mulatto labourer of 22 was admitted to hospital for intense throbbing pains in the hands and feet, and abdominal cramps. He had a positive Wassermann reaction following a chancre in the previous year, malaria of mixed tertian and subtertian types, marked albuminuria, and cold hands and feet, with local discolorations later going on to sloughing; blood pressure reached 100 mm.; there was no thickening or evident occlusion of arteries. In the discussion which followed the reading of the paper there was no acceptance of the view that the cause of the vascular condition was malaria.

C. L.

SQUARTI (Guido). **Sindromi nervose poco comuni nella malaria dei bambini.** [Rare Malarial Nervous Syndromes in Children.]—*Policlinico.* Sez Prat. 1922. May 1. Vol. 29. No. 18. pp. 571–577.

This is more a compilation than an expression of individual experience. The nervous symptoms which occur in children, not merely at the time of and, as one may say, in place of the rigor, but at any period of the asexual cycle, are collected into various syndromes, such as comatose, eclamptic, tetanic, meningeal and polyneuritic, the last being held to be an essentially circulatory disturbance resulting from parasitic localization, and the consequent changes in vessel walls and nervous elements. In treatment, preference is given to oral over rectal administration, "hypodermic" injection being reserved for grave cases. The bibliography comprises Italian and French works.

C. L.

CHIMISSO (L.). **Contributo epidemiologico e clinico sull' infantilismo malarico.**—*Riforma Med.* 1922. March 13. Vol. 38. No. 11. pp. 241–243. With 3 figs. in text.

Three striking cases, with photographs, of infantilism with enlarged spleen and malaria are here described—males of 18, 24 and 23 having heights of 4 ft. 7¼ in, 4 ft. 4½ in. and 4 ft. 1 in., and having not yet attained puberty. The first of them had, however, seven years later, achieved a height of 5 ft. 5 in., acquired a satisfactory physique, and accumulated a family.

C. L.

FERRO (Paolo). **Lesioni epatiche nella malaria.**—*Giorn. di Clin. Med.* Parma. 1921. June 30. Vol. 2. No. 10. pp. 361–365.

Hepatic malarial lesions are the result of an inflammatory process. Treatment and prophylaxis must avoid excessive stimulation of the liver functions. A careful examination of hepatic function should always be made before proceeding to a systematic treatment of chronic malaria, especially by the modern method with Ehrlich's salts.

J. Rosslyn Earp.

IONESCO (D.) & POPPER (M.). **La cirrhose hépato-splénique paludéenne.**—*Presse Méd.* 1922. June 3. Vol. 30. No. 44. pp. 477–478.

As long ago as 1871 LANCEREAUX described a malarial hepatic cirrhosis with enlarged spleen and jaundice. The cirrhotic type found in Roumania occurs in anaemic cachectics, with enlarged abdomen containing a big spleen, ascites, obvious evidence of venous portal obstruction, but without increased size of the liver, jaundice or pigmentation. There is oedema of the lower limbs. The liver shows obvious fibrosis, which microscopically is almost entirely extralobular and is accompanied by formation of new biliary canals, by hyperplasia and usually pigmentation of Kupfer's cells. There is also hyperplasia of the splenic connective tissue, congestion of its sinuses, and accumulation of pigment in its endothelial cells. It suggested that the hepatic trouble is secondary to splenic changes and that the rational treatment would be splenectomy.

C. L.

MENDELSON (Ralph W.). **A Genuine Case of Malarial Polyneuritis.**—*Jl. Trop. Med. & Hyg.* 1922. June 1. Vol. 25. No. 11. pp. 139–140. With 1 text fig.

A Siamese man was brought to hospital unconscious on the third day of an illness characterized by progressing paralysis of all the limbs. The blood showed a severe infection with *Plasmodium falciparum*. After 40 gr. of quinine administered intravenously he recovered consciousness but with paralysis of the limbs, complete in the lower, incomplete in the upper. There was no sensory change, subjective or objective. Deep reflexes were absent, except the left wrist jerk. Wassermann's reaction was negative, although the "heart revealed a compensating aortic stenosis." Beriberi is ruled out by the sudden onset, alcohol by the history of the case. There being no history of lead, mercury, arsenic, silver or ergot, a process of exclusion and the presence of *P. falciparum* determine the diagnosis.

C. L.

GROS (H.). **Un cas sporadique de paludisme autochtone.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 191–193.

An old lady of 74, who had evidently never left France, had a tertian fever at 8 years old, influenza with pain in the left hypochondrium at

73, and a quartan fever at 74. A first blood examination was negative; a second revealed, in six stained slides, a single body in a red corpuscle with nine merozoits. " Malaria cannot accordingly be questioned." The only other known case in the neighbourhood was the old lady's son-in-law, who had, four years earlier, an infestation with *P. vivax*. The conclusion reached is that a carrier of *P. vivax* has communicated, to one who has never left the country, *P. malariae*; and that this circumstance, if verified, has the value of an experiment and will constitute a certain proof of the specific unity of the Plasmodium of malaria. [But the gaps in the argument require for their surmounting a degree of mental courage or agility with which we are not all endowed.]

C. L.

GENEVRIER. **Le traitement moderne du paludisme et sa stérilisation par les injections intraveineuses de quinine.**—*Presse Méd.* 1922. May 20. Vol. 30. No. 40. pp. 431-432.

The writer's attitude is distinctive. He is one of those who hold that malaria is divisible into three stages: the first before gametocytes form, a period put at from 10 to 12 days, and one during which the organism is held to be particularly vulnerable; a third in which visceral sclerosis has occurred, with cachexia and anaemia, a stage in which treatment is practically useless; and a second, intermediate, stage. His views regarding treatment are equally definite. Intravenous quinine is an integral part of his routine treatment, in doses of 1·2 to 1·4 gm. on the first, third and sixth days, while cacodylate of soda is injected subcutaneously on the second, fourth, fifth, and thereafter daily for the seventh to the eighteenth days. Quinine, 1 gm. by mouth, is given once or twice a day, but with absolute cessation on the eighth, ninth and tenth, and again on the thirteenth, fourteenth, fifteenth and sixteenth days. The paper omits any reference to the kind of malarial parasite concerned, or to the actual results obtained.

C. L.

MAXCY (Kenneth F.). **Limitations to the Use of Quinine Intravenously in the Treatment of Malaria.**—*Public Health Rep.* 1922. Mar. 24. Vol. 37. No. 12. pp. 693–701.

There is no evidence [*cf.* ACTON, this *Bulletin*, 1921. Vol. 18. pp. 335–8] that disinfestation in malaria is more readily obtained by intravenous than by oral administration of quinine. Intravenous quinine produces, if given rapidly, a fall, possibly dangerous, in blood pressure. It causes, if there be leakage, as there may be in the most careful hands, cutaneous necrosis very slow to heal, nerve necrosis with paralysis, and [possibly vascular necrosis with] thrombosis. It may be followed by certain nervous symptoms. The intravenous route should accordingly be reserved for those cases with urgent clinical indications, or those in which oral administration is impracticable; if used the dose should be of 5 gr., and twelve should be looked upon as the maximum; and it should be so diluted that 1 cc. of solution contains not more than half a grain of the drug, and so given that the rate of administration does not exceed 1 cc. per minute, adrenalin solution being injected if the blood pressure fall.

C. L.

SEGUIN. **Du traitement du paludisme, maladie essentiellement curable (2e communication).**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 237–246.

Dr. Seguin has received a number of protests to his statement that, in the absence of reinfection, quinine is a certain specific for malaria within 10 days if gametocytes have not formed, within 60 days if they have. He describes nine illustrative positive cases.

C. L.

MATHIEU. **Note sur le traitement du paludisme par la quinine.**—*Arch. Méd. et Pharm. Nav.* 1922. Mar.–Apr. Vol. 112. No. 2. pp. 97–111.

This note is based on observations made upon 117 malarial army invalids during three voyages between Beyrouth and Toulon, each voyage occupying two to three weeks. The prevention of clinical relapses during these short voyages was best obtained by administration of 3 gm. of quinine hydrochloride daily, but this dose produced two cases of haemoglobinuria. Some particularly deplorable sequelae to intramuscular injections of quinine were put on board which, as the writer points out, are only to be expected when this procedure is delegated to nurses and orderlies.

C. L.

MAYER (Martin). **Die Behandlung der Malaria.** [Treatment of Malaria.]—*Klin. Woch.* 1922. Mar. 11. Vol. 1. No. 11. pp. 527–529.

This contribution to a clinical journal naturally contains statements of personal opinion and experience without evidence offered to support them. The treatment recommended is that of NOCHT, of the Tropical Diseases Institute at Hamburg, from which institution Martin Mayer sends his paper. It consists of 1 gm. daily, divided into four or five equal fractions. Intramuscular injection in doses of 0·5 gm. is advised for cases where the stomach is upset, while for grave cases the route should be intravenous and, to avoid collapse, limited to 0·3 or as a maximum 0·5 gm. For disinfestation a daily dose of 1 gm. on five consecutive days of each week and continued for six or eight weeks is advised. These doses refer to quinine hydrochloride; if the sulphate be used the daily dose should be increased to 1·12, and if the tannate to 2·5 gm.

C. L.

WRIGHT (Thomas E.). **Suggestive Mixed Treatment in Chronic Malaria.**—*New Orleans Med. & Surg. Jl.* 1922. Mar. Vol. 74. No. 9. pp. 612–616. (Discussion pp. 616–618.)

Drawing attention to those chronic malarias which resist treatment, the writer draws analogies with syphilis and explains them as being due to the hypothetical formation of "multiple foci just outside the peripheral blood. A treatment giving a rapid and decided plasmodiacidal effect, together with a substantial penetrating effect as regards the multiple foci, is one rather to be desired." The following treatment is recommended. Daily for from 4 to 6 days 20 gr. of "quinine," half by mouth, half intravenously. Thereafter the same daily dose twice a week for two or three weeks. The economic loss resultant on chronic malaria is insisted upon. In subsequent discussion BASS urged that a technique involving intravenous medication is rarely justified. LEDBETTER emphasized those rare comatose and blackwater cases where quinine is not absorbed. TILLING distinguished between quinine by "mouth" and quinine in solution, the former term apparently referring to administration in solid form.

C. L.

REH (Max). **Zur Behandlung der Malaria.** [The Treatment of Malaria.]—*Muench. Med. Woch.* 1922. Mar. 31. Vol. 69. No. 13. pp. 470–471.

On the strength of 18 per cent. of relapses in 29 cases treated during 1919 by his own technique as compared with 33 per cent. of relapses in 49 cases treated during 1918 by NOCHT's technique, the writer advises his own. It is as follows: For 60 hours give at two-hourly intervals 0·2 gm. of quinine, night and day. Repeat the course after a pause of one or two days. Then administer during 15 days a course of quinine and arsenic pills, on the 5th, 6th, 10th and 11th days, giving in addition 0·2 gm. quinine morning and evening.

C. L.

SUZUKI. **Sur la quinothérapie dans le paludisme des enfants.**—*Arch. Méd. des Enfants.* 1922. Jan. Vol. 25. No. 1. pp. 1–14. With 4 charts.

Experiments on rabbits showed that quinine hydrochloride was most toxic if given intravenously, and progressively less so if administered intramuscularly, rectally, subcutaneously and orally. In rectal administration the concentration of the solution was immaterial. The minimal lethal doses are not here reproduced, since their selection appears to be arbitrary. Further, the effect of different salts of quinine upon bacilli of the coli group is held to be indicative of their effect upon Plasmodia. Finally, in describing the rectal administration of quinine, in malaria of apparently undetermined type, to children of 13, 2½, 9 and 6, the writer highly commends this route.

C. L.

NAGGER (S. B.). **Treatment of Malaria in Pregnant Women and Newly-Born Children.**—*Practitioner.* 1922. June. No. 648. Vol. 108. No. 6. pp. 441–442.

The treatment recommended in these cases is the intravenous or intramuscular injection of 914. "Four injections (0·4 gm.) were found quite enough for curing the fever, anaemia and debility."

C. L.

HELE (T. S.). **Malaria in Macedonia, 1915–1919. Part IV. Chemical Investigations on the Excretion of Quinine by Soldiers in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 251–266.

The investigations here detailed were curtailed by the late arrival of apparatus and by the cessation of possibilities for work. In no instance was there more than a trace of quinine recovered from the faeces, although stomach washings showed its presence after both intravenous and intramuscular injections. There was evidence of more rapid absorption from a healthy alimentary canal then from muscle. Excretion by the kidneys was most rapid in the first half-hour after administration, was negligible after three days, and in no case amounted to more than from 10 to 30 per cent. of the quantity ingested. In six cases of haemoglobinuria in which urine was freely secreted, the excretion of quinine differed little from the normal. In a case with suppression of urine the drug, naturally enough, remained in the body. Interesting points in two autopsies were the recovery of quinine from the liver three hours after death at the rate of about 10 per cent. of the total amount administered during life, the proportion being in one case reduced by half 24 hours later; and the recovery of considerable quantities from the glutei, presumably from the site of injections, which had in fact been made previously into the buttock.

C. L.

DUPÉRIÉ (R.) & OBRENOVITCH (E.). **La résistance globulaire dans le paludisme secondaire.**—*C.R. Soc. Biol.* 1922. May 6. Vol. 86. No. 16. pp. 945-946.

In 118 malarial cases infected with the various parasites, the proportions of the different single and of mixed infestations being unindicated, 58 per cent. showed an increase in the fragility of the red corpuscles, the remaining 42 per cent. being of normal or supernormal resistance. Fragility was greatest, 83 per cent., in mixed infections of *Plasmodium vivax* and *P. falciparum*; was 62, 55 and 47 per cent. respectively in cases harbouring *P. falciparum*, *P. vivax*, and in those in which no Plasmodium was detected after repeated examinations of the blood. In none of these instances are the actual numbers involved mentioned, nor is this done in support of the statement either that fragility is increased during the phase of the parasites' maturity, during the apyrexia preceding a paroxysm, and while gametocytes exist; or that it is normal or increased at other times. Quinine was not found to influence this condition.

C. L.

JANCSÓ (Nikolaus). **Experimentelle Untersuchungen ueber die Malariainfektion des Anopheles und des Menschen beeinflussenden Umstände.** [Researches on the Circumstances influencing Malaria Infection of Anopheles and Man.]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. Beiheft 2. pp. 5–48. With 9 text figs.

In these experiments, carried out between the years 1901 and 1905, 22 *Anopheles maculipennis*, infected from 18 cases of tertian malaria, inoculated 22 persons with the same infection. Corresponding figures for quartan malaria were 18, 13 and 3; and for subtertian 69, 22 and 43. In the case of the last, crescents appeared on the sixth day after inoculation. The cases are described at length, considerable but nevertheless insufficient for their purpose. Perusal of the paper leaves the impression that it cannot be the present-day scientific value of these twenty-year-old observations which has prompted their publication now at such obvious expense.

C. L.

BASS (C. C.). **Studies on Inoculation of Experimental Animals with Malaria.**—*Amer. Jl. Trop. Med.* Baltimore. 1922. Mar. Vol. 2. No. 2. pp. 107–114.

Pointing out that although horses, mules, dogs, monkeys, rabbits, mice, guinea-pigs, hedgehogs, bats, wolves, cats, pigeons, doves, magpies, screech-owls, turtles, frogs and lizards have been inoculated with human malarial blood, infection has never been transmitted except in the case of the chimpanzee, and then only with *Plasmodium vivax* and with survival only for ten days, Bass reports inoculation of three guinea-pigs, four rabbits and one *Macacus rhesus* with *P. falciparum*. He has checked the results by culturing Plasmodia from the same case in a medium made with the serum of each of these experimental animals, while as controls similar cultures with human sera were made. All the controls succeeded, all the other experiments failed, Plasmodia disappearing from the blood of experimental animals within 24 hours except in the case of one guinea-pig, in which they persisted over that period but had disappeared in 48 hours. No illness followed the inoculations. It is concluded that these animals are resistant to, and probably immune from, human malaria.

C. L.

CHIMISSO (Luigi). **Su un plasmodio della malaria di scimmia** (*Macacus rhesus*).—*Haematologica.* Naples. 1922. Feb. Vol. 3. No. 1. pp. 38–54. With 1 plate.

A *Macacus rhesus*, probably coming from India, and used for experimental purposes not indicated in the communication, was found to be suffering from infestation by a Plasmodium. Constant examination of blood films revealed rings of various sizes with decoloration of erythrocytes and absence of Schüffner's dots. Sporulating forms were never found in the peripheral blood, although after death some appear to have been detected from spleen and liver, but are not described. The attention of systematists will doubtless be mainly attracted by the statement that, apart from difference of sex, there are described five different forms of gametocyte, one resembling human tertian malaria, one resembling quartan, a "semilune-simili," a "pseudo-semilune," and an ovoid. The beautiful coloured plate and the writer's definiteness render it scarcely possible that it can be lack of conviction which, after all, leaves the creature zoologically nameless.

C. L.

LEGER (Marcel). *Plasmodium* **d'un Singe de la Guinée française** *Cercopithecus campbelli* **Wath.**—*C.R. Soc. Biol.* 1922. Apr. 29. Vol. 86. No. 15. pp. 837-840. With 6 text figs.

Plasmodium bouilliezi, deemed to be a new species, was found in the heart's blood of this ape, freshly killed. It is held to differ from *P. kochi* in the following particulars. Its host comes from West and not from East Africa. The young parasite is not annular but elongated, with protoplasm compact and nucleus practically non-existent. The schizont, held to be adult, is pigmented and non-amoeboid, and measures 2·5 to 3μ in diameter. The macrogametes cause an enlargement of the erythrocyte, have a diameter of 7·5 to 8·5μ, a vesicular non-staining nucleus, a dense caryosome and coarse olive-green pigment, uniformly distributed. The microgametes, about a quarter as numerous and somewhat smaller than the macrogametes, are often deformed, have a large diffuse nucleus and a number of chromatin granules about one pole. These are figured, but the writer has unfortunately omitted the legend, nor has he indicated his reasons for holding that the "excessively rare" schizonts have a cycle which cannot be brought into agreement with that of *P. kochi.*

C. L.

BLACKLOCK (B.) & ADLER (S.). **A Parasite resembling** *Plasmodium falciparum* **in a Chimpanzee.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 99–106. With 1 plate.

In a chimpanzee at Freetown in West Africa the authors found a parasite, both small rings and crescents, morphologically indistinguishable from *P. falciparum,* and apparently identical with that described by REICHENOW as occurring in the chimpanzee and gorilla, and stated by him to be the human parasite [see this *Bulletin,* Vol. 17, p. 146]. The authors tried to infect *Anopheles costalis,* and also to transmit the infection to two Europeans, but were not successful.

In the same chimpanzee some large amoeboid forms resembling *P. vivax* in enlarged pale red cells, and some large band-shaped equatorial forms resembling *P. malariae* were found in small numbers on two occasions.

The animal also suffered from dysentery, and passed large numbers of Strongyloides larvae and cysts resembling *Blastocystis hominis.*

When in course of time it died, the immediate cause of death appeared to be a heavy infestation of both lungs with Strongyloid larvae, an account of which is forthcoming.

A. A.

i. GENOVESE (Francesco). **La Malaria in Provincia di Reggio Calabria.**—*Malariologia.* 1921. Apr. 30 & June 30. Ser. 1. Vol. 14. Nos. 1–2 & 3. (Ser. 2. Vol. 7. Nos. 1–2 & 3.) pp. 3–41. With 5 text figs. and pp. 51–72.

ii. BRAUNS (W.). **Zwei Krankheitsfälle mit malariaähnlichem Fieber.** [Two Cases with Fever resembling Malaria.]—*Deut. Med. Woch.* 1922. Mar. 3. Vol. 48. No. 9. p. 287.

iii. STÉFALOYANNIS. **Paraplégie palustre.**—*Jl. des Practiciens.* 1922. Jan. 21. Vol. 36. No. 8. p. 40.

iv. COMESSATTI (Giuseppe). **Osservazioni cliniche e Terapeutiche sulla malaria.**—*Il Morgagni.* 1922. Jan. 31. Vol. 64. Parte 1 (Archivio). No. 1. pp. 1–53. With 2 plate-figs.

v. BASS (C. C.). **The Standard Treatment for Malaria recommended by the National Malaria Committee.**—*Bull. Soc. Path. Exot.* 1922. Mar. 8. Vol. 15. No. 3. pp. 169–178.

i. These observations, considering in detail the geology, hydrography, forestation and malarial distribution of Calabria, appear to have a purely local interest.

ii. In two instances there occurred fever, in the one of a tertian, in the other of a quartan type. They disappeared after the administration of quinine. The first occurred during an epidemic of influenza; the second patient had diphtheria. Plasmodia were not found in either.

iii. A man became paraplegic during a malarial attack and recovered after two series of intravenous injections of quinine. Whether the blood was examined or syphilis excluded is unstated.

iv. In this full clinical treatise the writer records his agreement with text-book descriptions of the subject.

v. This communication, with its French summary, brings to the notice of Frenchmen the Standard Treatment advised by the National Malarial Committee of the United States, and familiar to readers of this *Bulletin*.

C. L.

JIMÉNEZ (Rafael Medina). **El Paludismo en el Estado Zamora.** *Gac. Med. de Caracas.* 1921. Dec. 15. Vol. 28. No. 23. pp. 351–365.

PEUTZ (J. L. A.). **De behandeling van gevallen van malaria. Welke niet door chinine genezen.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Aug. 13. Year 65. 2nd Half. No. 7. pp. 854–856.

NIEUWENHUIJSE (A.). **Malaria en behandling der hardnekkige gevolgen.** [Correspondence.]—*Ibid.* Nov. 12. No. 20. p. 2518.

LEPROSY.

CATANJAL (Andres). **Culion Leper Colony, Philippine Islands.**—*Jl. Philippine Islands Med. Assoc.* 1921. Sept.–Oct. Vol. 1. No. 5. pp. 191–195.

The author is a member of the Philippine Health Service, so writes with authority in reviewing fourteen years' segregation of lepers at Culion, beginning in the second half of 1906. His first table shows the deaths caused by leprosy in the Philippines in 1903 and 1918 as 199 and 130 respectively, the latter figure including 87 deaths at Culion; but excluding Culion, Palawan Province, to which the lepers were transferred, they have been reduced by 1918 to only 21·60 per cent. of the figure of 1903. If the Culion colony is included the number of deaths from leprosy after twelve years' enforcement of segregation was reduced to 62·32 per cent. of the number in 1903, three years before segregation. The yearly admissions to the colony during the four years ending 1917, as compared with those of the first three and a half years, also show a reduction to 66·91 per cent. of the earlier figures. (It must be allowed that the admissions during the first three and a half years were unduly high owing to special efforts then made to isolate as many lepers as possible). The mortality among the segregated lepers has steadily fallen, which disproves the alleged deficiencies of the food supplied. Considering the comparatively short time the colony has been in existence the above official account affords satisfactory evidence of the beneficial results of the segregation policy [see also this *Bulletin*, 1922, Vol. 19, page 388].

Leonard Rogers.

BODAAN (L.). **Leprosy among the Karo-Bataks and the Way of Combating it.** (With a Preface by Prof. Dr. W. SCHÜFFNER.)—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1922. Pt. 1. pp. 1–24. With 45 figs.

This is an interesting account by the Missionary in charge of a leper village settlement in Java, where voluntary isolation is carried out, with illustrations of the houses, etc. Although it contains no medical data of value it presents a good example of what can be done for lepers by tactful and sympathetic treatment.

L. R.

DA MATTA (Alfredo). **Notas sobre a lepra no Amazonas.**—*Brazil Medico.* 1921. June 4. Year 35. Vol. 1. No. 23. pp. 287–291.

The author draws attention to the gravity of the position as regards leprosy in the State of Amazonas, and to the entire inadequacy of the present provision for dealing with it. In February, 1908, the Government established a small "pseudo-colony" (da Matta) for lepers at Umirisal on the left bank of the Rio Negro. Entirely exaggerated reports as to the size and efficiency of the scheme spread through Amazonas and the territories bordering it, and lepers from all parts of the State and from beyond its boundaries flocked to Umirisal under the impression, unfortunately quite mistaken, that there was there a model establishment able to accommodate a large number of sufferers from the disease. In 1919 power was given to the executive to acquire land for the purpose of founding a leper colony, but up to the present nothing has been done.

The author is of opinion that there are at present from 800 to 1,000 lepers in the State of Amazonas. In a brief discussion of the history of leprosy in America he maintains that the disease is of European introduction. Leishmaniasis (uta) and blastomycosis (espundia) were well known to, and are clearly described by, the Incas ; no description of leprosy, however, is, according to the author, to be found in Inca sources. Further, the disease is extraordinarily rare among the aboriginal population, the author having, in the course of 26 years, met with only two cases in Indians.

F. S. Arnold.

SANDERS (J.). [**La Lèpre. Rapport au Conseil d'hygiène des Pays-Bas.**]—*Versl. en Mededeel. Betr. de Volksgezondheid.* 1921. Nov. [Summarized in *Bull. Office Internat. d' Hyg. Publique.* 1922. Mar. Vol. 14. No. 3. pp. 303–305.]

In 1920, 19 lepers were known in Holland, 16 males and 3 females, 4 being in hospital and 9 in a satisfactory state at their homes, where precautions were being taken to avoid others being infected. Only one had apparently contracted the disease in Holland, from a brother from Guiana, and the rest were imported cases from Guiana and the Dutch Indies, in the latter of which compulsory notification has been in force since 1917. Recently leper villages subsidized by Government in the Dutch Indies, containing 770 sick, have been found more effective than asylums, and progress is being made in prophylaxis. In Dutch Guiana there are 1,500 lepers among 120,000 population, but the legal powers of compulsory segregation have not been enforced. The author agrees with HANSEN that leper asylums should not resemble prisons and be enclosed by walls.

L. R.

DE MAGALHAES (Afredo). **Kann Lepra spontan heilen?**—*Dermat Wchnschr.* 1921. Aug. 13. Vol. 73. pp. 857-859.

The spontaneous healing of leprosy is well known, especially in nerve cases, and a case is recorded of 15 years' duration which became stationary and the patient lived for 40 years. Two cases of tubercular leprosy of 20 and 30 years' duration with healing are quoted and others referred to.

L. R.

LAPORTE. **Trois cas de lèpre dans un régiment de tirailleurs sénégalais.**—*Arch. Med. et Pharm. Milit.* 1921. Nov. Vol. 75. No. 5. pp. 373–378.

Medicin-Major Laporte describes three cases of leprosy found in a regiment of Senegalese on the Rhine, one of which showed numerous lepra bacilli, while the other two were early anaesthetic cases with patches showing loss of pigment and sensation in which no bacilli could be demonstrated, and he points out the danger of infections occurring in Europe from such cases. In 1917 he had to examine two Senegal regiments for leprosy and detected 23 cases, most of whom had leprous relatives in more advanced stages of the disease, and they were repatriated. Some had escaped detection on recruitment through fraudulent representation by substitutes; so search for and repatriation of such early cases among African regiments is very necessary.

L. R.

PERKINS (Granville A.). **The Preparation of Certain Drugs used in the Treatment of Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1921. Mar.-Apr. Vol. 1. No. 2. pp. 62-67.

A brief summary of work on the chemical composition of chaulmoogra, hydnocarpus and codliver oils is given from Moss's work in 1879, including the recent use of soluble preparations in the treatment of leprosy and tuberculosis. The author concludes with the suggestion that it may prove possible to make a still more effective drug by properly combining a toxic element like arsenic or antimony with a fatty acid, if WALKER's idea of the absorption of toxic fatty substances by acid-fast bacilli is correct, while if ROGERS is right in believing in the efficacy of unsaturated fatty acids in general a less expensive preparation than those of chaulmoogra oil may be obtained from some of the available very highly unsaturated fatty acids.

L. R.

OHARA (M.). **Pharmacological Studies of a Few Derivatives of Chaulmoogra Oil.**—*Japan Med. World.* Toyko. 1922. Jan. 15. Vol. 2. No. 1. pp. 1-4.

The author has made a pharmacological study of sodium gynocardate, gynocardate ethylester, and of gynocardate iodoethylester made in his laboratory, method not stated. The last two are not readily soluble in water, so saturated solutions of both were prepared with Ringer solution, from which various dilutions were made, 100 cc. containing 0·0054 gm. of iodoethylester and 0·00177 gm. of the ethylester respectively. The lethal doses per 10 gms. of the frog for each of the 3 preparations were respectively 0·01 gm. of sodium gynocardate, 0·05 gm. of the ethylester, and 0·03 gm. of the iodoethylester. The conclusions arrived at were :—

CONCLUSIONS.

" 1. Sodium gynocardate, gynocardate ethylester and gynocardate iodoethylester produce the central paralysis. The toxic action is more marked in sodium gynocardate, the next is iodoethylester, and the least is ethylester.

" 2. On isolated frog heart the iodoethylester had almost no action, but ethylester has a slight paralytic action.

" 3. They have inhibitory actions on the isolated rabbit intestine. On rabbit uterus they have stimulating action. They seem to act on the muscles themselves. The action of gynocardate iodoethylester is the weakest.

" 4. On the blood vessels all three drugs have contracting action. In diluted solutions they seem to have dilating action on the rabbit ear vessel.

" 5. On the blood pressure sodium gynocardate has a transitory lowering and then recovers, while the other two drugs have only lowering action. This action is a peripheral and not a central action."

L. R.

CAWSTON (F. G.). **Antimony in the Treatment of Lepers and Hydatid Disease.**—*Jl. Trop. Med. & Hyg.* 1922. Feb. 1. Vol. 25. No. 3. pp. 27-28.

In three or four lepers treated with 1-3 cc. doses of Oppenheimer's colloidal antimony, the ulcers healed and paralytic symptoms improved, but in one early anaesthetic case no change had occurred after a month. In two more Indian lepers in which the intramuscular doses were pushed up to early antimony poisoning the ulcers dried up and one was reported in good health a year later.

L. R.

GUJO (Koretake) & CHUMA (Masaru). **[A Histological Study on the Leprous Tissues by Vital Staining.]**—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*). 1921. Nov. Vol. 20. No. 11. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol 2. No. 3. p. 79.]

Leprous nodules chiefly consist of histoblasts, *i.e.*, epitheloid, follicular and giant cells, the follicular being epithelioid cells formed after they have digested the lepra bacilli, while the giant cells originate from the histoblasts and differ from those of tubercle in always resembling bone marrow cells.

L. R.

GREENBAUM (S. S.) & SCHAMBERG (Jay F.). **Demonstration of Lepra Bacilli by Aspiration of Nodules.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 29. Vol. 78. No. 17. pp. 1295-1296. With 1 text fig.

In leprotic infiltration of the hypodermic tissues where for any reason excision of a nodule cannot be done, acupuncture is a simple and practically painless method of demonstrating the lepra bacillus. A tightly fitting small record syringe containing a few drops of sterile water or saline is passed into a nodule which has previously been submitted to light massage, the fluid is injected and drawn in and out of the syringe several times to emulsify the tissues, and slides are then made with the fluid and stained by the Gram and Zielh-Neelsen methods. In 100 per cent. typical groups of acid-fast bacilli in intracellular clumps and separate, as well as granules, will be found which are diagnostic of leprosy, for very few occur in lupus. The bacilli may also be found in enlarged subcutaneous lymph nodules and sometimes also in macules.

L. R.

BRITO FONTES (A. de). **La réaction de fixation du complément avec le sérum de lépreux et l'antigène tuberculeux de Besredka.**—*C.R. Soc. Biol.* 1922. Feb. 11. Vol. 86. No. 6. pp. 331-332.

Since EITNER, in 1906, obtained the Wassermann reaction in leprosy various antigens have been found to give reactions with the blood of lepers, while they are also sensitive to injections of tuberculin. The present author has tested Besredka's tubercular antigen by the complement fixation test with the blood of 19 lepers in the Lisbon leprosarium, using the technique of KUSS and RUBINSTEIN and, as controls, the sera of known tubercular cases with negative Wassermann reactions, the bloods being obtained 24 hours before the tests were made. Positive reactions were obtained with 8 men and 8 women, and negative ones in 2 men and 1 woman, or 84·2 per cent. of positive results.

L. R.

TURKHUD (D. A.) & AVARI (C. R.). **Gaté-Papacostas Reaction in Leprosy.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 850–851.

GATÉ and PAPACOSTAS accidentally discovered that two drops of commercial formalin added to 10 cc. of clear syphilitic serum in a small test-tube formed a jelly-like mixture within 24–36 hours and that this " Formol-Gel " test coincided with the Wassermann reaction in 85 per cent. of cases. In the Bombay laboratory the writers have compared the Wassermann and formol-gel reactions. Of 186 bloods 44 gave positive Wassermanns, and only 30, or 68 per cent., gave a plus formol-gel test, and of 15 with a — Wassermann none gave a + formol-gel one. Of 124 negative Wassermanns 8 gave a + formol-gel reaction ; no less than 6 of the 8 were lepers. This led them to examine the bloods of 116 lepers in the Ackworth Leper Asylum, and every one of them gave a positive formol-gel reaction with inactivated serums, so they think it is likely to prove a valuable test for leprosy.

L. R.

MARCHAND (H.). **La cholestérinémie des lépreux.**—*Bull. Soc. Path. Exot.* 1922. Mar. 8. Vol. 15. No. 3. pp. 159–160.

Estimations have been made of the cholesterin in the blood of four lepers and found to vary much as in syphilis, being about normal in an early case, 1·60 gm., but reduced to from 1·20 to 1·25 in three advanced cases. In one of these it rose to 1·50 gm. after intensive treatment with chaulmoogra oil, so further observations on a larger number of cases in relation to treatment would likely be of interest. GRIGANT's calorimetric method was used in the tests.

L. R.

MAIÉ (Shin). **Experimentelle Versuche bei Goldfischen** (*Carassius auratus*) **mit säurefesten Bazillen.** [Experimental Researches on Goldfish (*C. auratus*) with Acid-fast Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 28–38.

Material containing leprosy bacilli in the lesions and nasal secretions of a leper were inoculated into goldfish and the bacilli multiplied and developed in the brain, while intraperitoneal and subcutaneous injections resulted in the bacilli being found in the brain, liver, spleen and nerves, remaining unchanged without increase for three to four months in the nerves, spleen and genital organs. In only one case was phagocytosis of the bacilli in the brain seen. Inoculation of the nasal secretions did not produce dissemination.

L. R.

UCHIDA (M.). **Studies on Rat Leprosy.**—*Japan Med. World.* Tokyo. 1922. Jan. 15. Vol. 2. No. 1. pp. 4–7.

——. **[A Report on the Study of Rat Leprosy.]**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. Nov. No. 2252. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. pp. 75–76.]

During the examination of 427,000 rats in Tokyo 30 cases of rat leprosy were found, or 1 to 14,000 rats, which is an underestimate, as only those showing depilated areas and acid-fast bacilli in smears from the inguinal glands were examined. They were all in *Mus decumanus* (*Epimys norvegicus*), as in most of the recorded cases. The area of skin affection varies from the whole body to small portions, the back being most affected, while in seven ulceration was present; nodules are rare. The glands and subcutaneous tissues are also involved, showing granulation tissue with large cells containing many bacilli. In six cases small hard tubercles were met with in the lungs; in twelve the spleen was enlarged without any nodules being present, and the other organs showed no macroscopical changes, although the bacilli were found in all the organs, muscles, nerves, cord, bone marrow, etc.

Animal experiments showed that young *Mus decumanus* could be infected by inoculation in five to seven months with bacilli in all the organs except the spinal cord, while white rats, mice and French mice only developed slight signs of rat leprosy. Attempts to infect these animals with human leprosy, however, failed, only the glands near the site of injection showing bacilli without any signs of their having multiplied. Smears from rat-fleas (*Laelaps echidninus* Berlese) from leprous rats showed fairly numerous acid-fast bacilli, but they could not be proved to be lepra bacilli, as animals could not be infected from them.

Of many previous attempts to cultivate rat lepra bacilli only those of HOLLMANN were successful, but Uchida now reports having isolated four acid-fast bacilli from his rat leprosy cases, one of which produced pigment, while each showed slight differences on culture; he found glycerine gelatine with yolk of egg or horse serum to be the best media, and three of them have been kept growing for half a year. Inoculation of rats with the cultures did not produce typical rat leprosy, but with strains 1 and 3 after several months the organisms were found around the nuclei of large mononuclear cells in the neighbourhood of the injection in the skin. Which of these four strains, if any, is the etiological organism of rat leprosy is not yet determined.

L. R.

BIÉRER (Paul). **Sur un cas de lèpre.**—*Arch. Méd. et Pharm. Milit.* 1921. Nov. Vol. 75. No. 5. pp. 379–381.

ERRATUM.

Vol. 19. No. 5. Last line of p. 390, for *Guinea* read *Guiana.*

TROPICAL DERMATOLOGY.

DUBREUILH & JOULIA (P.). **De l'intertrigo mycosique, forme nouvelle d'epidermophytie due à une levure.**—*Ann. de Dermat. et de Syph.* 1922. Apr. 6th Ser. Vol. 3. No. 4. pp. 145–162. With 2 text figs.

This is a most interesting paper on a form of dermatitis of which a few examples have been reported sporadically, but without anything like the authority of this communication. The genitocrural fold is the most frequent position for the eruption, which occurs usually as deep red patches on the inside of the thigh. The surface is unbroken, smooth, shining as if varnished, sometimes slightly moist. There is no induration or elevation of the patch. Its margins are irregular, with a fine scaly collar of exfoliation, beyond which the skin becomes abruptly healthy. Near this principal patch are found small islets of desquamated skin surrounded by the collar as in the larger patch, which begins in the same way. Vesication, so common in trichophytic patches, does not occur. There is intense itching, worse at night. The same condition may be found in the vulva, and under the breast in fat women. In a nursling a month old the eruption originating in the groin spread, to occupy the whole of the lower part of the trunk and body.

Nine cases are recorded in detail, in all of which the same organism was demonstrated. This occurred as spores and mycelial filaments. The parasite is differentiated from the achorions and the trichophytons by the fact that reproduction is by exogenous spores in this type, and by endogenous sporulation in the other two conditions.

Cultures readily grow on Sabouraud's media, and the organism was shown to be a yeast. Treatment with an ointment, acid sal. 1–2 gm., acid benz. 1 gm., lard 30 gm., is usually rapidly successful.

E. G. Graham Little.

OTA (M.). **Brief Notes on** *Epidermophyton rubrum*, **Castellani, 1909** (*Trichophyton purpureum*, **Bang, 1910) and** *Trichophyton violaceum* **var.** *decalvans*, **Castellani, 1913, with Remarks on "Eczema marginatum" ("Tinea cruris seu inguinalis") in Japan and "La Li Tou" or "Parasitic Folliculitis" ("Tinea decalvans" pro parte) of South China.**—*Brit. Jl. Dermat. & Syph.* 1922. Apr. Vol. 34. No. 4. pp. 120–124. With 3 text figs.

The author states that the commonest fungus met with in Japan as causing "Eczema marginatum," "dysidrosis" and "onychomycosis" is the *Epidermophyton rubrum* (Castellani). In three cases of baldness, designated by the local Chinese name "La Li Tou," *Achorion Schönleinii* was demonstrated in two, and *Trichophyton violaceum* in one.

E. G. G. L.

CURASSON. **Transmission à l'homme de la teigne du dromadaire.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Mar. Vol. 2. No. 3. pp. 70–73.

Ringworm is common in the dromedary, and does not cause serious symptoms, nor does it often become extensive. But the disease is

readily communicable to man, and the author was able to demonstrate the fungus in the hair of the beard of several Moorish drivers, as well as in the hair of the dromedarics under their charge.

E. G. G. L

FONTOYNONT (M.) & SALVAT (Pax). **Lésions mycosiques dues au** *Saccharomyces granulatus* **observées à Tananarive (Madagascar). Leur guérison par le bleu de méthylène.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 53–59. With 1 plate.

The authors report two cases of a mycotic affection observed in Tananarivo, caused by the *Saccharomyces granulatus* of VUILLEMIN and LEGRAIN. The first case, which alone is described in detail, was in a native woman, with multiple ulcers distributed practically all over the body. The ulcers began as swellings which broke down later, and left scars. The general health of the patient progressively declined. One of the swellings was opened and a granular mass the size of a pea shelled out easily. Examination of the mass and of the purulent discharge from the ulcers showed the presence of a saccharomyces identified by LANGERON and by the authors with the organism described by VUILLEMIN and LEGRAIN. Internal administration of methylene blue acted as a specific, when iodide of potassium had failed of effect.

E. G. G. L.

WEIDMAN (Fred D.) & MCMILLAN (Thomas M.). **A Comparison of Ingredients of Ringworm Culture Mediums with Special Reference to American and French Crude Maltose.**—*Arch. Dermat. & Syph.* 1921. Oct. Vol. 4. No. 4. pp. 451–468. With 16 text figs.

Weidman and McMillan endeavour to standardize the growths of various strands of ringworm on culture media, French and American, for it has long been an unfortunate difficulty in classifying ringworms that, unless one was able to get the same media as used in Paris, one could not compare results with any profit. They found that American agar produced the same characteristics as the French, that the method of filtering was unimportant, and that with all the moulds used except the microsporons, American sugars and peptone made no difference. But with the two microsporons tested it was essential to use French peptone and maltose.

E. G. G. L.

i. NOC (F.) & JOUENNE. **Les mycétomes à grains noirs du Sénégal.**—*Ann. Inst. Pasteur.* 1922. May. Vol. 36. No. 5. pp. 365–385.

ii. JOUENNE. **Un cas de mycétome à grains noirs.**—*Bull. Soc. Méd.—Chirurg. française de l'Ouest-Africain.* Dakar. 1921. Jan.–Feb. 3rd Year. No. 11–12. pp. 16–21.

iii. ——. **Nouveau cas de mycétome à grains noirs.**—*Ibid.* Mar. No. 13. pp. 36–37.

iv. ——. **Un cas de mycétome à grains noirs.**—*Ibid.* May. No. 15. 94–95.

i.–iv. The authors sound a note of warning as to the identification of cases of "mycetoma with black granules," which is a frequent disorder in Senegal. Clinical symptoms are very variable, and comprise the true Madura foot type as well as a diffuse oedema of either upper or lower limb, and again nodules or infiltrated plaques. The victims are usually subjects of syphilis or malaria, or both; more rarely, of tubercle. Three cases, reported also in ii, iii, and iv, are summarized. In all the same type of organism was noted. Its characteristics on various media are carefully described. The authors conclude that it is to be classed as a *Madurella mycetomi*, and this opinion was supported by LANGERON, to whom the cultures were submitted. Treatment in the earlier phases, before infection of bone takes place, is often quite successful with pot. iod. and novarsenobenzol, combined or not with local application of collargol, and small surgical procedures such as curetting.

E. G. G. L.

SCHMITTER (Ferdinand). *Actinomyces Asteroides* (**Eppinger**) **Isolated from a Madura Foot.**—*Jl. Trop. Med. & Hyg.* 1921. Mar. 15. Vol. 24. No. 6. pp. 79–80.

The patient was a native woman, of the island of Cebu, with a "Madura foot" which was amputated. Attempts to isolate the organism in culture media failed owing to contaminations. Inoculations into guinea-pigs resulted in growths from which pure cultures could be made on various media, and their characteristics are described and the organism identified as above.

E. G. G. L.

MCGEE (H. S.). **Report of a Case of Madura Foot.**—*Southwestern Med.* 1922. Mar. Vol. 6. No. 3. pp. 107–109.

The patient was a Mexican native, aged 40, with a swelling of the left foot resulting, in the first instance, from crushing Some three years later a nodular growth on the dorsum of the foot was noted and excised, and sections from it were returned from the University of Texas with " a diagnosis of mycetoma."

E. G. G. L.

BASKIN (M. J.). **Primary Actinomycosis of the Skin.**—*Jl. Amer. Med. Assoc.* 1922. May 6. Vol. 78. No. 18. pp. 1367–1368. With 1 text fig.

This is a report of a case of direct inoculation of the skin of the left hand of a trapper of animals. The earliest lesion looked like a boil; this extended and became a nodular mass with discharging sinuses from which the fungus was readily demonstrated. The author advises that the lesion should be freely curetted and dressed with Dakin's solution.

E. G. G. L.

PAGENSTECHER (Gustav A.). **Madura Foot, more properly called Mycetoma.**—*Jl. Amer. Med. Assoc.* 1922. May 6. Vol. 78. No. 18. pp. 1363–1365. With 4 text figs.

A report of two cases, the first in a man aged 54, with a swollen right foot in which numerous sinuses discharging pus were found, from which yellow fungus-containing granules could be demonstrated.

The second was a more advanced case, in the right foot of a man of 47; granules (colour not stated) were found consisting of massed myceleum. No cultures were made.

E. G. G. L.

MONTPELLIER (J.). **Note biologique au sujet des Mycétomes. Essais de vaccinothérapie.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 7–8.

This records an attempt at vaccinotherapy in a case of Madura foot, of the variety *Aleurisma apiospermum*. Cultures of *Aleurisma apiospermum* in bouillon, filtered, but without other preparation, were used. During the treatment there were slight rises of temperature, and some local reaction, but the disease was not sensibly affected. Deviation of complement, negative before vaccination, became definitely positive after the fifth injection.

E. G. G. L.

FOOT (Nathan Chandler). **Pathology of the Dermatitis caused by** ***Megalopyge opercularis*****, a Texan Caterpillar.**—*Jl. Experim. Med.* 1922. May 1. Vol. 35. No. 5. pp. 737–753. With 2 plates.

This paper was prompted by the ravages of a larval moth, *Megalopyge opercularis*, in Texas, epidemics of widespread dermatitis caused by it occurring in 1913 and 1920. The larva is very like that of the flannel moth, which occurs chiefly in the Northern States. A useful summary of the distribution of urticating caterpillars adds to the value of this paper. Personal experiments with the larva, sent by post from Texas, showed that the venom is contained in the cuticle of the caterpillar as well as in the setae, but not in the long feathery hairs. The nature of the poison is not ascertained definitely, but it is rendered inert by boiling.

E. G. G. L.

LANE (C. Guy). **Dermatitis caused by Oil of Citronella.**—*Arch. Dermat. & Syph.* 1922. May. Vol. 5. No. 5. pp. 589–590.

Oil of citronella is widely used as a preventive of mosquito bites. Dermatitis from its use is rare and Lane describes a case. The patient was a girl of 21. The rash was noted on the next day after application as a follicular papular eruption without any weeping or vesication. It disappeared within a week with soothing lotions.

E. G. G. L.

PANTALEONI (D.). **L'acariasi da grano in Romagna nel 1921.**—*Policlinico.* Sez. Prat. 1921. Dec. 19. Vol. 28. No. 51. p. 1724.

An epidemic of acariasis occurring in the autumn, in Romagna. The common features were an itchy cutaneous eruption, simultaneous spread to all the members of a family, and an original contact with grain. The offending mite is not specifically mentioned.

A. A.

MENDELSON (Ralph W.). **An Exceptional Tropical Ulceration.**—*Jl. Trop. Med. & Hyg.* 1921. Dec. 15. Vol. 24. No. 24. p. 317. With 3 text figs.

This paper describes three cases with symptoms clinically similar, all in Europeans who had been at the seaside when they contracted the disease. In all the cases the ulcer had been found on the leg or foot, and had commenced as a slight abrasion, on which a nodule developed later. This in a few days broke down, became painful, and the ulcer enlarged, and discharged purulent matter. In two of the three cases an identical mould, classed as " a monilia," was found.

E. G. G. L.

TOURNIER (E.). **Notes sur les ulcères phagédéniques des pays chauds et leur traitement.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 530–531.

Tournier emphasizes the fact that there are two varieties of tropical ulcer met with on the West African coast, one the true phagedenic ulcer, with Vincent's symbiosis (spirochaete and fusiform bacillus as its cause), and the other, much more frequently found, in which no spirochaetes are present, but only a polymorphic fine bacillus morphologically quite different from the fusiform bacillus. Clinically both types are characterized by the presence of a membranous ulceration, very resistant to treatment and tending to destroy large tracts of tissue, both superficial and deep. The first type, showing Vincent's symbiosis, is best treated with local applications of salvarsan, and is uninfluenced by atoxyl or antimony. The second type is eminently amenable to tartar emetic powder applied locally, and to a less degree to treatment by atoxyl. Local antiseptics are of little use in its treatment.

E. G. G. L.

APOSTOLIDES (Apost. G.). **Note on the Recent Epidemic of Tropical Septic Ulcer in Palestine (Tropical Sloughing Phagedaena).**—*Jl. Trop. Med. & Hyg.* 1922. Apr. 1. Vol. 25. No. 7. pp. 81–88.

Tropical ulcer seems not to have been noted in Palestine until 1919, when an epidemic described in this paper occurred, spread along the line of railway from Damascus by refugees from Mecca and Yemen. Bacteriological examinations showed the presence of Vincent's symbiosis, a spirochaete and a fusiform bacillus, in about 75 per cent. of the cases. While this is recognized as the effective cause of the condition, other circumstances are important adjuvants in the infection, such as ill health, poor nutrition, previous infection with syphilis and tubercle, and especially malaria. The coincidence of malaria is indeed so frequent that the author suggests that the mosquito is responsible for the transmission of both diseases.

The incubation period of tropical ulcer has been much disputed. The author quotes an example which allowed of establishing this very convincingly, a typical nodule being observed 48 hours after a direct inoculation. The most effective treatment in the author's experience is the intravenous injection of salvarsan, and the local application of 20 per cent. salvarsan ointment.

E. G. G. L.

VAN NITSEN (R.). **Le traitement de l'ulcère tropical.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 289–298.

Two stages of ulceration are considered : (1) the septic stage, when the ulcer is infected and extending in depth and extent. The following formula is favoured by the author—Iodoform, guaiacol, eucalyptol, and Balsam of Peru $\overline{\text{a.a.}}$ 10 gm.; alcohol, 100 gm.; sulphuric ether, to one litre. If this is found too costly, a 5 per cent. solution of Yadil is recommended. With careful treatment on these lines it is claimed that the septic period of ulceration may be reduced on an average to three days. (2) With the elimination of septic germs cicatrization begins, and this process is retarded by antiseptic applications. When the surface is free from infection, as demonstrated by bacteriological tests, the ulcer is excised, the wound kept under observation for one to four days, and if there is still no infection, which sometimes results from the operative interference, the edges are sutured, if the ulcer is not too large, or grafted if necessary. Statistics are quoted which show a very remarkable gain in time in the treatment of ulcers by this method as compared with ordinary procedures.

E. G. G. L.

MEO (Jean). **Au sujet du traitement de l'ulcère phagédénique.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. May. Vol. 2. No. 5. p. 130.

The author follows this procedure: (1) The ulcer is cleansed with a tampon soaked in tincture of iodine, or 1 per cent. solution of pot. permang. (2) It is dressed for three days with boiled water. (3) The cleaned ulcer is filled with powdered perborate of soda, renewed at first every two days, later every four days. Towards the 15th–18th day a dry dressing is applied. When syphilis is present (and 60 per cent. of the cases are associated with syphilis) specific treatment is added.

E. G. G. L.

CASTUEIL. **Traitement de l'ulcère phagédénique des pays chauds par le perchlorure de fer.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Feb. Vol. 2. No. 2. pp. 33–42.

The treatment here described consists in the application of a 20 per cent. solution of perchloride of iron, renewed daily at first, later every two days. In certain cases the administration of iodide of potassium hastens the cure.

E. G. G. L.

MATHUR (Sarup Narain). **An Epidemic of So-Called Naga-Sore at Unao.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. p. 96.

The author describes a series of cases of painful ulcer occurring in the rainy season in Unao. Smears from the ulcers showed the whole field to be full of "straight bacilli." [No further description is given.] The ulcers did well with dressings of copper sulphate lotion, gr. 4 to the ounce.

E. G. G. L.

VAN NITSEN (R.) & MOUCHET (R.). **L'Onyxis ulcéreux phagédénique.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 287–288.

This condition has apparently received little attention in treatises on tropical disease, but is nevertheless common in the authors' experience. The ulceration may begin with any finger, extends round the nail, which is finally shed, and there may be ulcers in other parts of the body as well. In 16 cases examined, 9 showed the combination of fusiform bacillus with Vincent's spirochaete; all showed the fusiform bacillus; and several showed mixed infections of staphylococcus, streptococcus and a diplococcus not named.

E. G. G. L.

PAROUNAGIAN (Mihran B.) & GOODMAN (Herman). **Ulcerating Granuloma (Granuloma Inguinale): A Report of a Rare Example of this Disease in a Syphilitic Patient.**—*Arch. Dermat. & Syph.* 1922. May. Vol. 5. No. 5. pp. 597–601. With 4 text figs.

The patient was a native white American, who had never left New York city. The upper lip, side of the neck, groins, and perianal regions were occupied by a mass of hypertrophic, foul-smelling, discharging red papules and nodules. There was no glandular enlargement. The tongue showed symptoms of syphilis, and there was history of a penile sore six years previously. A Wassermann test made on the day of his admission under the authors was negative, but was strongly positive after an injection of silver arsphenamin. Donovan bodies were not found at this time, but some months later numerous extracellular and intracellular encapsulated short bacillary forms resembling Donovan bodies were found. The patient made little improvement with injections of silver arsphenamin (8 were given) and neoarsphenamin (3 injections). The patient was lost sight of before tartar emetic medication could be given.

E. G. G. L.

ITURBE (Juan) & GONZALEZ (Eudoro). **Sobre un caso de granuloma venéreo proveniente de la Guayana británica y observado en Venezuela.** [Granuloma venereum in a Patient from British Guiana.]—*Contribución del Laboratorio Iturbe en el 3er Congresso Venezolano de Med.* 1921. pp. 23–28. With 1 plate.

The authors regard granuloma venereum as arising usually as a post-traumatic complication, after the operation of circumcision or the opening of a bubo, and bearing a close analogy with elephantiasis.

The patient was a negro of 27 years of age, who, two and a half years previously, had exhibited a subpreputial chancre diagnosed as syphilitic, but which, owing to its inaccessibility, had proved refractory to treatment. A small operation was undertaken to expose the sore and subsequent to this the condition of granuloma venereum developed. Medicinal treatment by mercury and neosalvarsan, surgical measures, such as scraping and cauterization, all proved unavailing. Wassermann and von Pirquet tests both yielded negative results. Microscopically, *Sp. refringens* was found, together with the "Donovan bodies." Treatment with tartar emetic was initiated and the author reports distinct improvement in the condition at the time of writing, when the patient had had 20 injections of Merck's 1 per cent. solution, starting with 0·01 gm. and increasing to three times this amount for the later doses.

H. Harold Scott.

CANGE (A.) & ARGAUD (R.). **Les "Nodosités juxta-articulaires" syphilitiques.**—*Gaz. des Hôpit.* 1922. June 15. Vol. 95. No. 46. pp. 741–746.

Under this title is described an eruption of indolent fibrous nodules, varying in size from that of a pea to that of a duck's egg, situated around the larger joints. Histologically the nodules occupy the subcutaneous cellular tissue. They are extremely chronic, and may last for years, or they may resolve or ulcerate. The geographical distribution of the affection is continually extending, and it can no longer be claimed as an exclusively tropical disease. A careful review of the literature is made, and the authors range themselves with the large and increasing body of opinion which regards these tumours as being of syphilitic origin. They insist on the superior value of mercurial treatment as compared with arsenical salts in dissipating the tumours.

E. G. G. L.

DE QUERVAIN (F.). **[Juxta-Articular Nodules.]**—*Lyon Chirurg.* 1921. Sept.-Oct. Vol. 18. No. 5. p. 561. [Summarized in *Jl. Amer. Med. Assoc.* 1922. Jan. 21. Vol. 78. No. 3. p. 248.]

The author describes a case of this condition in a native of Switzerland, who had never left that country. The patient was a man of 55. One of the nodules was excised and proved to have the appearance of a syphilitic gumma.

E. G. G. L.

MOUCHET (R.) & VAN NITSEN (R.). **Sur une dermatite verruqueuse des noirs de la Rhodésie du Nord-Est.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 235-239. With 1 plate.

The paper describes a series of seven cases of a warty eruption in natives of North-East Rhodesia. In many of the cases the eruption of warty lesions dated from infancy. The distribution was chiefly on the limbs, upper and lower, and when they disappeared the lesions left scars. They were not itchy or painful or inflamed. The disease is well recognized by the natives, who give it a local name. The authors regard it as analogous to the " verrucose dermatitis " described by LANE and MEDLAR in 1915 as occurring in the United States, and also later by PEDROSO and GOMEZ in Brazil. The authors were unable to demonstrate any fungus, and attempts at inoculation failed.

E. G. G. L.

GHOSH (Nishanath). **A Case of Leucoderma.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 100-101.

The patient was an Indian landowner, aged 40, married in early life and remaining without issue, *i.e.*, exhibiting sterility. The pigmentary disorder had persisted for 10 years. The condition cleared up completely with some months of treatment with a pluriglandular tablet, hormotone.

E. G. G. L.

MISCELLANEOUS.

MEDEDEELINGEN VAN DEN BURGERLIJKEN GENEESKUNDIGEN DIENST IN NEDERLANDSCH-INDIË. 1920. Pt. 10. pp. 76–153. [In Dutch and English.] **Rapport over de influenza-epidemie in Nederlandsch-Indië 1918. Report on the Influenza Epidemic in Netherlands-India, 1918.**

This is the work of a Commission appointed in November, 1918, to investigate the nature of the disease influenza, its cause, epidemiology, mortality, and the preventive measures and treatment employed in the epidemic which visited the East Indian Archipelago in common with the rest of the world. A questionnaire sent to all the medical practitioners brought 83 replies ; it is on these that the report is based.

Etiology.—The reporters evidently incline to the Pfeiffer bacillus, but conclude that nothing is positively known.

As to complications, 48 correspondents noted relapses, 63 pneumonia (apart from the febrile period), 45 haemorrhages (chiefly nasal, pulmonary or intestinal), 29 psychical symptoms, 24 premature delivery, 29 diarrhoea or dysentery. Tuberculosis and beriberi were noted fairly frequently.

Epidemiology.—The disease was first heard of in June on the East Coast of Sumatra. It rapidly extended from this and other foci in Sumatra and Java, till in August and September a great part of those islands and of Borneo was implicated. The east part of the Archipelago was at that time free. It was not till October that the Sunda Islands and Celebes were reached, and till November that the turn came of the Moluccas and New Guinea. The evidence shows that the disease was introduced from the Straits Settlements. In some islands the social life was seriously disturbed, *e.g.*, in Saparua (Amboina) " only 8 of the 800 inhabitants were able to do their work." In the November epidemic there was scarcely a town in the Dutch East Indies which was not attacked, and as before stated this was much the more serious. In the month of November the mortality curve for Java rose from about 25 in the previous month to 180 per 1,000. Another telling figure is the deaths in Java in November—402,163, as against 11,598 from cholera, smallpox and plague in the whole year !

A. G. B.

BRISCOE (Cornelius D.). **Observations on Porto Rican Soldiers admitted to Ancon Hospital with Influenza during the Recent Epidemic.** —*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 28–31.

The influenza epidemic was mild and does not call for remark.

The stools were examined in 249 cases and lateral spined schistosome ova were found in 11 [*S. haematobium* is evidently a lapsus for *S. mansoni*]. The curious point is that none of these patients had had any symptoms referable to schistosomiasis. The author has not been able to find anything of the kind in the literature.

A. G. B.

MALONE (R. H.). **A Bacteriological Investigation of Influenza. Part II. Carried out under the Indian Research Fund Association.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 210–229.

The observations—expressed largely in tabular form—recorded in this paper refer to influenza in Bombay between July, 1919, and June, 1920, when the city had already, in 1918, undergone two epidemics. Diarrhoea and meningeal symptoms were very rare, the mortality was comparatively low (about 10 per cent.), and the disease was from the outset milder than in the earlier epidemics.

The predominating organisms in the sputum were Pfeiffer's bacillus, pneumococcus, and non-haemolytic streptococcus.

The *streptococcus* was equally evident in mild and severe cases, and also in healthy persons during and after the epidemic, and is therefore considered as more or less accidental.

Pfeiffer's bacillus occurred in 75 per cent. of 175 influenza specimens of sputum or pharyngeal secretion; in 83 per cent. of 41 out of 53 influenza cases in which the accessory respiratory sinuses were found, after death, to contain pus; as well as in 92 per cent. of 39 fatal cases in which bronchial tissue or lung tissue or pleural fluid was examined. On the other hand, the bacillus was demonstrated in only 18 per cent. of 138 specimens of pharyngeal secretion of healthy persons examined during the epidemic. The blood serum of influenza patients infected with the bacillus agglutinated the homologous strain in 77 per cent. out of 81 cases; the serum of 17 persons suffering from a variety of specific diseases and pathological conditions other than influenza did not agglutinate the bacillus—except in one of some cases of lobar pneumonia, and in one case of ankylostomiasis; nor was it agglutinated by the serum of healthy persons. Pfeiffer's bacillus is therefore considered to have had some direct connexion with this epidemic of influenza.

The *pneumococcus* was strikingly prevalent in severe cases and is considered to be a secondary invader and a potent cause of death. It was also noticed in healthy persons to be more often present during the epidemic than afterwards.

The author thinks that the failure to detect Pfeiffer's bacillus in some epidemics elsewhere may have been due to the use of unsuitable culture media.

A. Alcock.

VAN HOOF. **Valeur curative d'un vaccine contre la grippe.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 255–258.

The vaccine employed was the "compound influenza vaccine C2" prepared at the South African Institute for Medical Research. It contains *M. catarrhalis, B. influenzae* and an 8-valent suspension of pneumococci. The absence of streptococcus is due to the observation that these organisms have never or very rarely been found in influenzal sputa in Tropical Africa; indeed, the streptococcus plays a very slight part in the local tropical pathology as compared with Europe. The vaccine was sensitized by BESREDKA's method and was successful in the treatment of 18 out of 25 cases, the details of which are not given.

A. G. B.

TRESTON (M. L.). **Four Years' Surgery in an Indian General Hospital in Mesopotamia.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. pp. 283–294. With 2 text figs.

This paper is full of interesting detail, the author during four years having had 19,332 surgical cases under his care. [Here we must be content with a few points of wide general interest.] In Mesopotamia (as was long ago settled for India) chloroform is the right anaesthetic. Wounds from rifle and machine gun were always clean; wounds from other engines of war were almost without exception septic. For horrid septic wounds with fracture the author adds his testimony to the efficacy of the Carrel-Dakin treatment. Ghurkhas showed the most resisting power; Sikhs the least. Only five cases of gas-gangrene occurred, and two recovered; all were horrible bomb-wounds of the lower extremity; in all there was a long latent period (5–8 days or more); "one noticed in these patients the extraordinary mental alertness and the marked effect of the toxaemia on the cardiac muscle." Only one case of tetanus occurred in 1,412 cases, and here anti-tetanic serum (750 units) had been given. Every case must be judged by itself, but there should be no meddling with bullets in inaccessible places that appear to be doing no harm; even shrapnel bullets *can* be left, and there is a man now serving with his regiment, nearly four years afterwards, with one in his abdomen. In a man shot through the temple the bullet lodged inside his head some four and a half inches distant from the wound and seemed to cause no inconvenience. Ten cases were shots through the liver, and six through the spleen; all made an uneventful recovery except one man, shot through the liver, whose recovery was complicated by severe jaundice. In eye cases the eye was enucleated, leaving a frill of sclerotic round the optic nerve. Oriental sores occurred, principally during the cold season; various kinds of treatment were tried, and thorough scraping under chloroform followed by castor-oil dressing was found to give almost identical results with intravenous tartar emetic.

A A.

VINCENS. **Notes sur le fonctionnement du service chirurgical à l'hôpital de Douala (Cameroun), novembre 1917 à novembre 1919.** —*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 192–200.

In the two years 1918–19, 556 operations were performed at the Duala hospital with 22 deaths. The readiness of the natives for operation is great; to ensure prompt admission to hospital a man with hernia will even simulate strangulation. Inguinal hernia is frequent. The author would attribute this to the frequency of congenital malformations and, secondly, to cough. Most are of the oblique variety. 261 radical cures were done, of which 150 were right, 76 were left hernias, and 35 double [*cf.* this *Bulletin,* Vol. 12, p. 136, and Vol. 14, p. 233. In Zanzibar and the Gold Coast the right side is affected even more frequently; the reason is unknown.] Bassini's operation was chosen. The mortality was 1·53 per cent. and there were three relapses. There were 16 radical cures of femoral hernia. Hernial strangulation is probably not infrequent but patients do not come till their condition is bad. Of 21 such operated on, eight died. All these operations were done under spinal analgesia.

Next to hernia come operations on the urethra and bladder, *e.g.*, old strictures previously "treated" by the medicine men. Thirteen internal urethrotomies, one external, and five suprapubic cystotomies were done. Elephantiasis is not very common, but 12 cases of scrotal elephantiasis were relieved by operation. Among diseases of women metritis with discharge of pus is common. After dilation of the cervix the womb is curetted and tinct. iodi or chloride of zinc applied. Among traumatisms, lacerated wounds occasioned by sword-fish are common; in the case of limbs, amputation or disarticulation is usually necessary. Details are given of the wounds produced by "human panthers." Phagedemic ulcer is very common and no treatment is so good as Vincent's powder, but antisyphilitic medication is generally required as well.

A. G. B.

PENNINGTON (J. Rawson). **Surgery among Uncivilised Races.**—*Med. Record.* 1921. July 16. Vol. 100. No. 3. (Whole No. 2645.) pp. 89–95. With 7 text figs.

This is a very discursive article dealing not so much with any observed practices among savages tribes as with matters of miscellaneous interest, from the extensive mutilations resulting from gangrene decribed by THURSTON, to the prehistoric trephining disclosed by ancient skulls.

A. A.

BOMSTEIN. **Le traitement chirurgical de l'éléphantiasis du scrotum et de la verge.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 327–337. With 8 text figs.

An interesting paper which furnishes a record of successful surgical procedure carried out in the Belgian Congo under conditions difficult to realize by surgeons practising in civilized surroundings. The writer appears to have operated during a period of two years and eight months on more than 200 cases of elephantiasis of the scrotum and penis, with a mortality of only 1 per cent. In a few of the early cases he performed with his own hands the duties of general anaesthetist and of operating surgeon. He subsequently abandoned general for spinal anaesthesia and notes that a great saving of time was thereby effected. A 5 per cent. solution of stovaine was employed in doses of 1·5 cc. with no ill-effects beyond transient headache. Two cc. of the same solution occasionally produced nausea, yawning and malaise.

No details of the size and weight of the tumours removed are given, but judging from the low mortality and the figures portraying the different lines of incision advocated and practised it seems probable that some of the growths were small and the scrotal tissues not very extensively affected. To such a degree, however, was the operation popularized that it was, on occasion, carried out in native villages with the patient lying upon a mat in a tent and gossiping with his friends and acquaintances during its progress.

The writer advocates the use of the elastic tourniquet, rightly condemns the torsion of diseased and degenerate vessels as being certain to be followed by recurrent haemorrhage, and lays great stress upon rapidity of execution as the most important factor in obviating bleeding and ensuring good results. He details and illustrates many lines of incision practised by himself and other surgeons. It is evident, however, that these must necessarily vary in individual cases with the amount of healthy skin available for the purpose of providing cover for the testes, and that consequently no set operation can be recommended for general adoption. The old adage that one must cut one's coat according to one's cloth is peculiarly applicable.

The writer in some of his cases experienced difficulty in liberating and isolating the penis, and regards this as being often the most delicate step in the operation, an experience contrary to that of the reviewer in Indian cases.

The paper, though neither adding appreciably to our knowledge of the subject of which it treats nor formulating any new line of surgical departure, is valuable as testifying to the marvellous field for surgical practice afforded by the tropics, and as recording in modest terms an instance of individual surgical effort and achievement under tropical conditions.

J. J. Pratt.

SISTRUNK (W. E.). **The Kondoleon Operation for Elephantiasis: A Report of the End Results.**—*Southern Med. Jl.* 1921. Aug. Vol. 14. No. 8. pp. 619–625. With 4 text figs.

An earlier report on this subject was noticed in Vol. 13 (p. 37) of this *Bulletin.* The author has now operated on 31 cases of elephantiasis and 2 cases of lymph oedema. None was filarial. Every case of elephantiasis, he states, was preceded by lymph oedema, which in many instances was secondary to a mechanical blockage of the lymphatic or venous systems and in others apparently to a direct bacterial invasion of the tissues; in 15 instances the etiology was unknown.

Kondoleon's operation consists in the removal of a large extent of the skin, subcutaneous fat and deep aponeurosis from each side of the affected limb. The skin and a small amount of the cutaneous fat become adherent to the muscles and new lymphatic vessels are in time established. The technique is described with figures. The author concludes (1) that the Kondoleon operation controls the progress of elephantiasis; (2) the best results are obtained by previous treatment in bed for 2–3 weeks with elevation and firm bandaging of the limb; (3) a large amount of skin, fat and aponeurosis must be removed; (4) when patients are up and about the limb must be bandaged for an indefinite period and sometimes permanently after the operation; (5) the patient must previously be warned of this and that a perfectly normal limb is not to be expected; (6) second operations for the removal of hypertrophied skin are sometimes advisable.

The bibliography contains ten recent references.

The author writes from the Mayo Clinic, Rochester, U.S.A.

A. G. B.

DE MAGALHAES (P. S.). **As elephantiases e suas affinidades.** [The Elephantiases and Allied Disorders.]—27 pp. With 28 text figs. 1921. Rio de Janeiro: Imprensa Nacional.

A monograph on the elephantiases with a clinical history of a remarkable case in a woman now under the care of Professor Oscar BULHOES in the Santa Casa da Misericordia of Rio. The illness commenced as long ago as 1886. The hyperplasia of the nates and lower extremities is now so enormous that the patient is unable, night or day, to adopt any other than a sitting position and her weight is 133 kg., or just under 21 stone. An interesting account by Sir Patrick MANSON of a case of congenital elephantiasis of the scalp in a negro under the care of the author of the present monograph is reproduced from the *American Journal of the Medical Sciences* of February, 1893. The monograph is enriched by 28 remarkable illustrations from different sources.

F. S. Arnold.

BREENE (L. W.) & LINDEN (W. Zur). **Elephantiasis of the Scrotum.**—*U.S. Nav. Med. Bull.* 1921. Oct. Vol. 15. No. 4. p. 834. With 1 plate.

A brief account of a successful operation on a negro for a scrotal tumour estimated to weigh 50 lb.

A. G. B.

MACNAUGHTON (J. G.). **Brief Note on a Case of Elephantiasis of the Vulva.**—*Jl. Trop. Med. & Hyg.* 1922. Mar. 1. Vol. 25. No. 5. p. 55. With 2 text figs.

No information beyond that conveyed by two photographs, which show a very large tumour in a patient from Tanganyika Territory.

A. G. B.

LAMBERT (Robert A.). **Post-War Medical Conditions among Armenian Refugees in Southern Turkey and Syria.**—*Milit. Surgeon.* 1921. Sept. Vol. 49. No. 3. pp. 314–332. With 1 map and 4 illustrations.

The author was for a year or more Director, Aleppo District, of the Near East Relief. In 1915 a number of Armenians, variously estimated as half to one million persons, were driven into Mesopotamia and Syria. After the Armistice, those that had not perished were collected at Aleppo till they could be removed to their homes in the north. Not more than a quarter of a million could be accounted for. The refugees were poorly nourished, but examples of marked emaciation were exceptional; there were no cases of deficiency disease. Among the large disease groups eye infections were easily first; of cases seen in four months the great majority were trachoma and other forms of conjunctivitis, leucoma, staphyloma, pannus, entropion and corneal ulcers. The following extract is of interest:—

> "The importance of hygienic conditions in the treatment, as well as the prevention, of trachoma, was well demonstrated in the comparison of two orphanages in Aleppo. One was a newly established institution, with its eight hundred children quartered in army tents, in a well-ordered camp, with large playgrounds, ample bathing facilities, no crowding, strict personal hygiene. The other, with 1,600 children, occupied dirty, poorly lighted stone buildings, [with] inadequate bathing facilities and much overcrowding. The class of children admitted was the same, and incidence of trachoma was approximately 60 per cent. in each. Identical methods of treatment at the two institutions under the supervision of American physicians and nurses gave very different results. Within three months a majority of the cases at the camp orphanage were dismissed cured, whereas at the other institution there were very few cures. Furthermore, at the latter a certain number of new cases had developed. Later experience showed that in institutions of the second type recurrences or reinfection were very common, making efforts at eradication quite fruitless so long as living conditions were not materially bettered."

Among skin diseases Aleppo button was prominent. After giving information on the disease familiar to readers of the *Bulletin*, the writer says that he "was impressed with the striking differences between the disease seen in Aleppo, as regards gross features of the lesions, their distribution on the body and the clinical course, and the American form of the disease, which he had an opportunity of studying several years ago in the Amazon Valley." The application of aniline dyes, and that of mud practised by the natives, are believed to owe their efficacy to the exclusion of light.

In spite of the scarcity of water, malaria was the commonest of the infectious diseases, the long rainless period necessitating the use of cisterns. Other tropical fevers were sandfly and relapsing fevers, Notwithstanding the great prevalence of body lice and the crowded conditions of living, only sporadic cases of typhus were seen. Few cases of typhoid or dysentery and none of cholera were met with, though personal uncleanness, abundance of flies, unprotected food, contaminated water supplies, seemed to invite the attack of these diseases. The author cannot offer a satisfactory explanation.

Pulmonary and bone tuberculosis were widespread and have undoubtedly been increased by war conditions, and venereal diseases have increased exceedingly. The leper appears to have been wiped out by the war.

A. G. B.

MÜLLER (L. R.). **Ueber die Krankheiten des Orients.** [Diseases of the East.]—*Muench. Med. Woch.* 1921. July 22. Vol. 68. No. 29. pp. 905-907.

A sketch of disease conditions in Asia Minor; the author seems to have got most of his experience in Constantinople. He begins by calling attention to the rarity of some European diseases. Cancerous tumours of the internal organs are seldom seen, whereas those of the skin, and especially the face, are commoner than in Europe. Tabes and general paralysis are rare; the general paralytics in the Turkish asylums make up only 0·6 per cent. of the inmates, whereas in Europe the figure exceeds 10. Tuberculosis is very common among the poor; in Constantinople one-third of the cases in the surgical clinic are bone, joint or gland tuberculosis, and in the medical wards tuberculosis heads the list of diseases treated. Contracted kidney and high arterial tension are rare.

Coming to diseases of the East, he finds that intestinal affections are extremely common. All newcomers to Constantinople get the "Maladie de Bosphore," a feverish intestinal catarrh, which is usually believed to be a form of paratyphoid. Bacillary dysentery is frequent, amoebic less common at Constantinople than in the warmer lands to the south. Pappataci fever and dengue, attributed to *C. fatigans*, are common. Typhus and relapsing fever, he remarks, are not characteristic diseases of the East, except in time of war. For relapsing fever infection greater infestation with lice is necessary than for typhus. In 1½ years at a large hospital in Constantinople the author saw one case only of undulant fever. He does not tell us anything fresh or precise about malaria, but recognizes its wide prevalence. Bilharzia infections were not seen. [See also VON DÜRING, who has much to say about syphilis in Asia Minor, this *Bulletin*, Vol. 15, p. 281.]

A. G. B.

SCHILLING (Viktor). **Kriegshygienische Erfahrungen in der Türkei (Cilicien, Nordsyrien).** [Experiences of War Hygiene in Turkey (Cilicia, North Syria).]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. Beiheft 3. pp. 5–41. With 2 figs. and 4 plates.

The author was stationed at Aleppo, as adviser in hygiene on the lines of communication, from spring, 1916, to autumn, 1917, and visited Palestine on similar duties, as well as Constantinople, Smyrna and the interior of Asia Minor. He here gives an interesting account of the diseases and hygienic conditions met with, the result of his own experience, and that of numerous German and Turkish doctors.

The chief seat of *malaria* was not the coastal plain but the hills, where the Anopheles could be reached with difficulty. This led at first to failure to recognize the nature of the fever seen at high levels.

Typhus was the second great plague. The author had the impression that the delousing of the sick, inefficient though it was, rapidly checked the epidemic, although lice were still present, and he compares the suppression of yellow fever by the eradication of house mosquitoes and isolation of the patient. The almost complete disappearance of typhus in the summer months is similarly explained, in that the lice do not easily travel from man to man and the opportunities for washing reduce their numbers.

Relapsing fever was common among the Turks, but rare among the Germans. This the author explains by the fact of the transmission by louse excreta in scratching, which would more readily occur among the heavily infested Turks than the lightly infested Europeans. On the other hand, the Germans suffered heavily from typhus, which may be conveyed by a single louse bite.

Pappataci fever was little noticed among the natives, but very prevalent among travelling Turks and Germans. Its connexion with Phlebotomus was evident.

Dengue occurred in a small epidemic with joint pains and a typical saddle-back curve ; Stegomyia were very numerous.

Cholera was introduced twice from the north. The author formed a high opinion of preventive inoculation, though he is unable to give figures. It should be repeated every two months, or oftener in case of exposure.

Dysentery was seen in about equal shares of bacillary and amoebic ; the severest amoebic cases came from Baghdad and Damascus. Liver abscess was of rare occurrence.

Undulant fever was seen in Jerusalem and Smyrna.

Though in 1862, according to HIRSCH, few Europeans at Aleppo escaped an attack of *Aleppo boil*, the author found it uncommon and chiefly among native children in the dirtiest quarter. Germans became infected in Baghdad, and, infrequently, in Diarbekir and Mardin. These facts, the author says, are in favour of a mode of spread which disappeared with the draining of a marshy hollow in Aleppo itself, and are against the Phlebotomus theory, for these flies were to be found in large numbers.

Kala azar was not seen, though many suspicious cases were punctured, but it has been diagnosed at Hamburg in a man who apparently contracted it in the Amanus range ; it is known to occur in Baghdad [see KÜLZ, this *Bulletin*, Vol. 15, p. 281].

The rest of the paper concerns the difficulties with which the author and his colleagues were faced, not all of which seem to have been unavoidable, and he lays down a series of recommendation for future campaigns in warm countries. A list of 81 references to papers on disease conditions in the Near East is appended.

A. G. B.

DETZNER (Hermann). **Medizinische und hygienische Streiflichter aus dem Innern von Neuguinea.** [Sidelights on Medicine and Hygiene from the Interior of New Guinea.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 3. pp. 67–79.

This is a discursive article. The author expresses a fervent hope for the return of the time when New Guinea will again become the goal of a German administration, German physicians, and German planters and missionaries.

A. A.

CRICHLOW (Nathaniel). **The Climate and Health of the British Solomon Islands.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 15. Vol. 24. No. 24. pp. 268–269.

An article apparently intended for the layman. Malaria and dysentery (type not stated) are prevalent, but smallpox and typhoid fever are as yet unknown in these fortunate islands.

A. G. B.

HOLLENBECK (Henry S.). **Some Observations on the Medical Situation in West, Central and South Africa.**—*Jl. Trop. Med. & Hyg.* 1921. Dec. 1. Vol. 24. No. 23. pp. 304–305.

The author was a member of the Phelps-Stokes Commission* sent to make a survey of conditions affecting the education and general welfare of the natives in Africa, which in the course of a year visited British West Africa, Liberia, Cameroon, Belgian Congo, Portuguese West and South Africa. His task was to observe the sanitary and hygienic conditions, and he reports the results in this paper. With most of the points he makes those who know even a part of his vast field will heartily concur.

He notes the utter inadequacy of the medical force, both from the point of view of numbers and equipment, for the work that urgently needs to be done, but realizes that both Missions and Governments are at present hard put to it to obtain medical officers. There is similarly a dearth of trained native assistants. Facilities are lacking for training a native medical force capable of dealing with the local diseases. There is no school for such training and no general effort in this direction. [In this respect Britain is much behind France, none of whose colonies was visited.] This is a field on which Missions and Governments could co-operate. He notes the very high death-rate from preventable diseases, which is quite general, and the uncertainty—apart from sleeping sickness—whether the population of various places is not falling. He considers that malaria is the chief causative factor and in all the tropical colonies accounts for a large part of the excessively high infantile mortality. He points to the frequent failure of anti-mosquito measures. He cites the high percentage of hookworm infestation. He then comes to the proper care of infants, and notes [justly] that the very low vitality of some native peoples is probably due in part to faulty diet. The popular food in many cases does not fulfil the requirements of a complete diet. An instance is given from the Johannesburg mines, where a partial crop failure in a district whence natives were drawn led under strain to scurvy. An effort should be made to introduce more variety of food products and improved methods of cultivation. Sleeping sickness in the Congo is far from being under control; a much larger medical staff is required. Finally, among his conclusions, he states:—"More attention should be given to the teaching of hygiene and sanitation in the schools."

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* The Phelps-Stokes Fund in America has undertaken the task of surveying the educational work of missions and philanthropic bodies in America and elsewhere.

[Dr. Hollenbeck has in plain language pointed out wherein we have failed to reach a reasonably high standard in the application of hygiene in Tropical Africa, and it is to be hoped that his remarks will be widely read. Is, however, malaria the leading causative factor in Tropical Africa in the mortality both of adult natives and children? This statement is frequently made, but rests on no foundation of carefully recorded cases. The reviewer believes that we know very little of the causes of death in African natives, and that till the subject has been adequately studied any efforts we make to reduce the death-rate are likely to be ill-directed and ineffective. On the subject of hookworm Dr. Hollenbeck is vague, merely noting that the proportion of infection is frequently noted as 80–90 per cent. Except where it is proved otherwise, has hookworm infestation in Africans any more significance than infestation by other members of the numerous intestinal fauna?]

A. G. B.

LENZ (Wilhelm). **Phylogene Neurasthenie beim ostafrikanischen Eingeborenen.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 9. pp. 271–278.

We have here an entertaining account of the psychology of the African negro as illustrated in his everyday behaviour. According to the author the negro, by the action, through generation after generation, of a tropical climate, has become by nature and by nurture—or, as he puts it, "phyletically and ontogenetically"—a neurasthenic. The weak point of the negro is not lack of intelligence, not want of endurance, or even of a mechanical sort of diligence, but infirmity of purpose, mental sluggishness, want of energy and resolution. Behind this slackness of will must be some corporeal, some chemical defect, perhaps a deficiency of some hormon. The author thinks that the tropical sun has put a beneficial brake upon the mental energy of the African, and in compensation has endowed him with "the inexhaustible joy of life that fills the little black folk."

The author is of opinion that his conclusions are probably applicable to the inhabitants of all tropical countries, and that even the European by long residence in the tropics becomes something like the negro (dem Neger angenähert).

A. A.

i. MÉO. **Discussion des indices de robusticité chez les noirs.**—*Presse Méd.* 1921. Sept. 21. No. 76. pp. 1369–1370.
ii. HECKEL (Francis). **A propos de la densité humaine et de l'indice de robusticité chez les blancs et les noirs.**—*Ibid.* Dec. 31. No. 105. pp. 1907–1909.

i. The author, to whom it fell to recruit black troops in the French West African Colonies in 1914, found that the formula of PIGNET (height in centimetres — (chest measurement at greatest expansion in cms. + weight in kilos)) gave inaccurate results, which he attributed to the lesser density of the negro as compared with the white; the difference varied between 5 and 10 points. He tested another index described by KOBY, which he found unsatisfactory, and devised one of his own, in which the sum of the circumferences of the arm, thigh, calf and chest is subtracted from the height + waist measurement. Figures varying from 15-25 (excellent) to 50–55 (passable) were thus obtained in 4,000 examinations. In this formula less preponderance is given to the weight and more to the muscular and respiratory development.

ii. Heckel points out that the strength of a man does not depend on his configuration, that such formulae are valueless when applied to professional or natural athletes, as the negroes are in their own country, that since the war, and even before, we know that persons of mediocre appearance may be endowed with excellent physical qualities, that indexes of "robusticité" must be established by tests of action rather than by measurements, and that in any case negroes normally developed and without fat cannot be compared with whites less muscular and having subcutaneous as well as visceral and muscular fat, unless champions be selected for the comparison. He gives a list of champions with their heights and weights, and concludes that white athletes have the same weight and volume for the same height, and thus the same density as the negroes. Incidentally, he shows the absurdity of the rule accepted by MÉO that the weight of a healthy man in kilos should equal or exceed his height in centimetres above a metre.

A. G. B.

NEVES (José da Silva). **Distrito Militar do Congo. Relatório do ano de 1919.**—*Rev. Méd. de Angola.* Loanda. 1921. Aug. No. 1. pp. 167–180.

The report is devoted in the main to pointing out the serious insufficiency of the medical service in the Congo district of Portuguese West Africa. The distances are enormous, the difficulties of travel extreme, and the supply of medical officers and hospitals entirely inadequate to deal with the amount of disease prevalent among both Europeans and natives.

F. S. Arnold.

ARCHIVES DES INSTITUTS PASTEUR DE L'AFRIQUE DU NORD. 1921. July. Vol. 1. No. 2. pp. 201–213. **Fonctionnement des Services de l'Institut Pasteur de Tunis pendant l'année 1920.**

In 1920 the Pasteur Institute of Tunis was transferred from the control of the Department of Agriculture, with which it had been associated since 1894, to the Secretariat of the Tunisian Government.

The number of persons treated for rabies was 780, a figure lower than that of 1919, but characterized by the author as *honteux*, witnessing to the mal-application of the laws and the indifference of dog owners.

The 10,800 analyses made during the year are classified.

The report bears the initials of the Director, Dr. Ch. NICOLLE.

A. G. B.

COLONY AND PROTECTORATE OF KENYA. **Annual Report for the Year 1920, Bacteriological Laboratory.** [CLEARKIN (P. A.), Act. Senior Bacteriologist.]—15 pp.

The writer of this report, who took up his duties, on appointment, in May, writes that the year was spent entirely on routine, the examinations numbering nearly 11,000 and the duties including the preparation of calf lymph. There is consequently not much of general interest. In an outbreak of plague which occurred at Nairobi towards the end of the year, of 6,551 rats examined 11 only were positive, and these were all from infected houses; the remaining rats were caught by the health authorities and were all negative. Of malaria it is recorded that whereas in 1918, the last year of war, the ratio of benign tertian to subtertian cases was 1 : 1·4, in 1919 it was 1 : 6, and in 1920 1 : 5 (44 and 223). "It would thus appear that the type of malaria in Nairobi changed during the war and that now we have returned to our native type." Of 195 samples of faeces in which helminth. ova were found, 35 per cent. showed *Ancylostoma duodenale*, 22 per cent. *Taenia solium*, and 6·6 per cent. Schistosoma.

A. G. B.

SOUTH AFRICA. **The South African Institute for Medical Research. Annual Report for the Year ended 31st December, 1920.** [WATKINS-PITCHFORD (Wilfred), M.D. (Lond.), F.R.C.S. (Eng.), D.P.H. (Oxon), Director.]—1921. Johannesburg: Hortors Ltd., Printers. 46 pp. With 3 illustrations.

This Report contains much that is of interest. The Routine Division, as in the preceding year, made a profit, in this case £3,238, which was transferred to the Research Division.

Research Division.—The meningococcus was isolated from 77 cases of cerebrospinal fever and the pneumococcus from 14. Of 69 strains of meningococci examined 50 belonged to Gordon's Type I. All but one case occurred in native labourers on the Rand gold mines, and the great majority in Portuguese East Africans.

The appearance of most of the lungs of 40 cases of pulmonary infection in natives suggested influenzal broncho-pneumonia rather than lobar pneumonia, and *B. influenzae* was found in a considerable number, here again chiefly in Portuguese Africans. A satisfactory method of preserving the viability of pneumococci in cultures was devised: it consists in growth in defibrinated rabbit's blood, and desiccation in a vacuum.

After remarks on plague, silicosis, typhus and tuberculosis, the report comes to bilharzial disease. *Physopsis africana* has been demonstrated to be receptive to both *B. haematobia* and *B. mansoni*, but a more susceptible host for the latter is *Planorbis pfeifferi*; it has, however, to be remembered that Physopsis is the more common.

Routine Division.—A large fall in the number of examinations for malaria and of rats for plague was more than compensated by increases in other directions. In 193 examinations of faeces for dysentery there were 64 positives; *E. histolytica* was found in 60 specimens and in the other four Morgan's bacillus or Flexner-Y.

Though 257 of 1,051 specimens examined for enteric by Widal were positive, "a considerable number of cases which clinically are undoubtedly enteric are not giving positive results by agglutination tests." Possible reasons for this are considered and it is attributed to late or non-development of agglutinins in otherwise typical enteric fever. A case in point is described in which *B. typhosus* was isolated from the urine, but the serum gave negative agglutination tests right through. The Institute urges the local profession to take blood-cultures in the first week of the disease.

Plague made its appearance in the Union in the north-western portion of the Orange Free State. Naturally infected specimens of gerbils and multimammate mice have been received from the endemic area. Of 59 agglutination tests (Weil-Felix reaction) for typhus, only 18 gave positive results, though as many again were clinically cases of that disease. At Johannesburg the test has not proved so reliable for diagnosis as in Europe and Asia. The strain of *B. proteus* X 19 employed came from the Lister Institute. Possible reasons are discussed.

Under General Histology it is noted that 13 specimens of primary liver carcinoma in natives were seen during the year, though the condition is stated to be very rare.

A Research Fellow has been appointed to study the vitamin content of the diet of native mine-labourers.

A. G. B.

ASSAM. **King Edward VII Memorial Pasteur Institute, Shillong. The Fourth Annual Report for the Year ending 31st December, 1920.** [HORNE (J. R.), I.M.S., Director, and FOX (E. C. R.), I.M.D., Assistant to the Director.]—29 pp. 1921. Shillong: Printed by the Government Press, Assam. [Price 12 annas.]

Major KNOWLES vacated the Directorship in February, 1920, and till December 7 Mr. E. C. R. FOX, I.M.D., officiated as Director. The total number of cases completing the Pasteur treatment was 1,626, of which 1,542 were Indians and 84 Europeans. This is an increase of 15 per cent. on the preceding year. The various statistical details are exhibited in 18 tables. Jackals formed 24 per cent. of the biting animals and were responsible for no less than 28 per cent. of the total cases. The hydrophobia rate for their bites was 2·4 per cent. as against 0·79 for dog bites.

For kala azar 54 patients were treated. During the four years 1917–20, of 140 cases arriving for tartar emetic treatment 94 were cured, 32 died, and 14 left before treatment was completed. There was no epidemic of diphtheria in this year. The persistent occurrence of cases of enteric fever at Shillong between March and October is described as disquieting. The Institute realized by the sale of vaccines the sum of Rs. 35,027.

A. G. B.

WALLACE (A. F.). **Splenic Abscess.**—*Med. Jl. S. Africa.* 1922. Mar. Vol. 17. No. 8. pp. 155–157.

In two years at Broken Hill, Northern Rhodesia, the author has seen no less than 49 cases of splenic abscess in natives—19 at operation,

and the rest in the mortuary. In the ten years before he saw no such cases. The illness begins suddenly with high temperature, headache and general pains. After two or three days the patient feels better and complains of pain in the splenic region; the spleen is found to be enlarged and tender. Commonly it ruptures; if not, it continues to enlarge and becomes tympanitic. In some spleens post mortem there is the similitude of multiple infarction; in others the whole organ is affected. The author, under local anaesthesia, cuts down boldly on the spleen, which is invariably adherent to the abdominal wall, and inserts a drainage tube; in one instance eight pints of pus were let out. Cases have occurred in other parts of Northern Rhodesia. Of his 49, 3 were women, the rest adult males. The causation is obscure. "It seems to commence with an attack of influenza." In a pus specimen sent to the South African Institute for Medical Research spirochaetes were found and tick fever was suggested, but study of eight subsequent cases failed to establish this hypothesis. A specimen of blood serum sent to the same Institute agglutinated *B. paratyphosus* C; five later cases failed to do so and no record can be found of splenic abscess in this infection. A spore-bearing bacillus, presumably gas-forming, was also found. The tests for enteric, typhus, undulant fever, syphilis, were all negative. Amoebae could not be found in the pus. In the same period ten cases of cerebral thrombosis have been seen in natives, and in three of these the spleen was affected. The author suggests that the development of splenic abscess was prevented by death.

A. G. B.

STANTON (A. T.) & FLETCHER (William). **Melioidosis, a New Disease of the Tropics.**—*Studies from the Inst. for Med. Res., Federated Malay States.* 1921. Kuala Lumpur: F.M.S. Govt. Printing Office. 2 pp.

The authors in this short note tell us that they have identified the glanders-like disease first described by WHITMORE in Rangoon in 1912 [see this *Bulletin*, Vol. 1, p. 588; Vol. 2, p. 107] as present also in the Federated Malay States. They have published three communications on the subject which have not reached the Bureau; the substance of these is therefore reproduced from the present note.

"Fletcher in 1914 studied an outbreak of a septicaemic disease among laboratory animals, identified the causative agent, and showed that the disease was conveyed through contamination of food. Stanton (1917) in a study with P. H. Hennessy of outbreaks of a disease resembling Asiatic cholera, observed that patients who recovered from the initial attack might die later from a form of septicaemia, with lesions of the lungs and other viscera resembling those of miliary tuberculosis. Stanton identified the causative agent of this disease, first in the lesions at post-mortem examination, and later in the blood, urine, sputum, and in the fluid from cutaneous vesicles, of clinical cases. By feeding and by inoculation of pure cultures of the micro-organism, he reproduced identical lesions in a number of different animals—guinea-pig, rabbit, white mouse, rat, monkey, sheep and goat. He showed that the infecting agent was excreted in the faeces and urine of these animals. Stanton (1918) also observed several cases of natural infection in animals, one case in a domestic cat that had died of 'haemorrhagic distemper.' He suggested on epidemiological grounds that the infection might be a natural disease of rodents, and that infection is conveyed to man by contamination of food-stuffs by the excreta of these animals. Fletcher (1919) compared the micro-organisms isolated by Stanton and himself and established their identity."

Recently they have seen two further cases, one of chronic infection with lesions confined to the skin and subcutaneous tissues, and a fatal case with extensive abscess formation in the liver, lungs and spleen. The blood serum of the first case agglutinated the specific micro-organism in high titre (1–2,500 to 1–3,000), thus completing the proof of its causal relationship to the disease. It is concluded that the condition described by WHITMORE in Rangoon and by the authors in Malaya is one and the same disease, for which the name Melioidosis is proposed, " Melis " being a Greek term for a variety of conditions resembling glanders. The causative agent they name *Bacterium whitmori*.

A. G. B.

CORNWALL (J. W.) & LAFRENAIS (H. M.). **Bacilluria: Another Unnamed Organism.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 325–326.

This paper is from the Pasteur Institute of Southern India, Coonoor. The patient, a European, about 50, stated that he had been under treatment for paratyphoid A fever in Calcutta for three months, that his urine had been infected with *B. coli*, and that a vaccine had been injected. " Numerous short, fat, sluggishly motile bacteria, single and in short filaments " were found in the urine. A pure culture was readily obtained ; the characters are given.

" The organism is evidently not *B. coli communis*. It was strongly agglutinated by the patient's own serum, over 1 in 1,400, but not by typhoid or paratyphoid A or B serum. The patient's serum did not agglutinate *B. typhosus*, para A or B. The organism differs from the group containing *B. suipestifer*, *B. enteridis* and paratyphoid B in forming indol and fermenting salicin, and from the group containing *B. coli communis*, *B. neapolitanus*, and *B. acidi lactici* in failing to ferment lactose."

The authors consider that the diagnosis of *B. coli* in the urine was made on insufficient grounds; further, that the original illness was possibly due to infection with the bacillus now described and not to paratyphoid A.

They point out that when a urine is found to be swarming with bacilli it does not follow that they are either *B. coli communis* or belong to the typhoid group.

A. G. B

MUTERMILCH (S.). [**Abstract** (in *Bull. Inst. Pasteur.* 1921. Dec. 15. Vol. 19. No. 23. pp. 854–859.) **on Certain Ultramicroscopic Filterable Viruses having a Selective Affinity for Tissues of Ectodermal Origin.**]

This is an abstract of a number of papers, many of them by LEVADITI and his collaborators, on a group of " ultra-viruses " (filterable viruses) having an affinity (as LEVADITI concludes) for tissues derived from the ectoderm (epithelium and nerve-tissue) and responsible for a group of infective diseases, termed by him ectodermoses. Examples of these ectodermoses are epidemic encephalitis, herpes, cow-pox, rabies, polyomyelitis, and perhaps (as NETTER believes) mumps. These ectodermoses, while having a generic affinity for all tissues of ectodermal origin, are some of them more specifically attracted to nerve-tissue, and others of them to epithelial tissue ; the former, of which encephalitis is an example, are termed neurotropic, the latter, of which cow-pox is an example, are termed epitheliotropic; but a neurotropic virus can be adaptively epitheliotropic and vice versa.

These speculations have an experimental basis, which may be summarized very briefly as follows.

1. There exist several filterable viruses that show affinities with that specifically known as the virus of epidemic encephalitis. First, there is the *salivary virus*, which exists in the saliva of healthy subjects. This, when inoculated into the cornea of the rabbit may either be innocuous, or may provoke a kerato-conjunctivitis of varying degrees of virulence comparable to that caused by inoculation with the virus of herpes labialis or that of encephalitis; in one such case the animal died with symptoms of encephalitis. This salivary virus does not originate from cultivable microbes, or from salivary spirochaetes, nor yet from the pure salivary secretion drawn by catheter; it exists only in the mixed saliva from the mouth, and appears to be traceable to the epithelium of the mouth.

2. Then there is the *keratitogenous and encephalitogenous salivary virus* found in some healthy subjects, but particularly in the saliva of a healthy subject who had been frequently in contact with encephalitics. This differs from the preceding only in virulence. When inoculated into the rabbit, either by corneal or by cerebral route, it causes a fatal encephalitis.

3. Thirdly, there is the *keratitogenous and encephalitogenous herpetic virus*, discovered in herpes of the cornea by GRÜTER and in herpes labialis by LÖWENSTEIN and by DOERR and VÖCHTING, and shown by LEVADITI to be capable of provoking a fatal encephalitis when injected into the rabbit's cornea.

4. Finally, there is the specific *keratitogenous and encephalitogenous virus* that exists in the naso-pharyngeal secretions and brain in cases of epidemic encephalitis.

From this series of filterable viruses we get the concept of a neurotropic virus becoming adaptively epitheliotropic, and the concept is avouched by cross immunity experiments on rabbits, for although vaccination by the ordinary salivary virus (No. 1) has conferred immunity against the other three viruses in only two experiments, in vaccination by the other three viruses reciprocal immunity is conferred in each case.

Converse experimentation shows that an epitheliotropic virus can accommodate itself to neurotropism, LEVADITI and his collaborators having proved that fresh vaccinia virus after being passed a great many times through rabbits' brain (where, as MARIE had previously observed, it engendered a rapidly mortal malady) was still able, when inoculated from the brain into the skin, to produce a good eruption of vaccinia.

The virus of encephalitis can pass from the mother to the foetus in the rabbit, and also in the human female.

In eight experiments LEVADITI, HARVIER, and NICOLAU, have not been able to confirm the observation of NETTER, CÉSARI, and DURAND, that the encephalitic virus inoculated by the cerebral route into rabbits can be found in the animals' salivary glands.

The subtle and pervasive suggestiveness of the above observations and speculations justifies a brief notice of a subject that otherwise lies outside the scope of this *Bulletin*. References to original papers—some of which have been consulted by the reviewer—will be found appended to Mutermilch's abstract.

A. A.

Woodcock (H. M.). **An Introduction to the Study of Haematophagy.** —*Jl. Roy. Army Med. Corps.* 1921. Nov. & Dec. Vol. 37. Nos. 5 & 6. pp. 321–341, & 418–431. With 2 text figs. and 7 plates.

Haematophagy is the business which may be carried on by a cell of ingesting blood cells, and is to be distinguished by name at least from phagocytosis. The author's object is to draw attention to some of the phenomena of haematophagy as seen by him in different kinds of cells.

He begins with the " haematophagy " commonly included in the term phagocytosis, namely the ingestion of red blood corpuscles by the macrophages (certain large uninuclears and the endothelial megacaryocytes). In this kind of haematophagy the haemoglobin of the ingested reds is completely assimilated by the macrophages, not rejected as pigment. As a result of this kind of haematophagy the macrophage grows, and proliferates in the form of blood platelets. The author points out that Wright in 1906 and Downey in 1913 had ascribed the origin of blood platelets to megacaryocytes, but that they had missed the important fact that these cells digest and assimilate red blood corpuscles.

" Haematophagy " of an incomplete and not quite normal kind is detected by the author in the lymphocytes of the guinea-pig. These particular lymphocytes have a predilection for red cells, and ingest them, but they cannot completely digest them, and they remain as Kurloff bodies with the haemaglobin altered indeed but not assimilated.

This imperfect haematophagy suggests to the author a primitive kind of behaviour, a sort of primal instinct, inherent in the unicellular animal, but latent in the differentiated tissue cells of metazoa, for feeding on solid food. Though latent, this inclination may be aroused by unconventional stimuli. Under some such subtle stimulus provided by the virus of hydrophobia certain nerve cells may become haematophagic, and the author detects the results of this abnormal behaviour in the Negri bodies, which he regards as fundamentally similar to Kurloff bodies. Nerve cells may also be goaded to haematophagy by stimuli originating in viper venom, or in emulsion of *Bacillus pyocyaneus.* Other cells of ectodermal derivation may be exasperated to haematophagy by other kinds of virus, and the author has no doubt that the Guarnieri bodies in small-pox infection represent the results of haematophagy by epithelial cells. The author has a similar explanation for Prowazek's bodies and Mallory's bodies, and, in short, for the entire Chlamydozoon concept. Finally, the Rickettsia enigma may be resolved into " platelet-granules "—a by-product of the digestion of blood cells by endothelial cells of the vascular tissue, apparently a sort of reflexion of the process of blood-platelet formation by macrophages not distracted by any peculiar stimulus.

We have now reached the limits of the author's speculation, and are brought to the conclusion that haematophagy by tissue cells perverted by abnormal stimuli is a great pathogenetic phenomenon, of which Negri bodies and their like are the obvious physical signs.

As to the nature of the stimulus, the author suggests a verbal explanation of a minute quantity of ferment specific for each disease starting the haematophagy in each particular kind of cell. Once the haematophagy is started more and more of the ferment is produced—*Crescit indulgens sibi dirus hydrops.*

Besides the hypothetical ferment, there are further to be considered the hypothetical waste or excretory substances of the haematophagous cells—these, or the further products of their decomposition, may be toxic and may contribute to the pathological effect of the particular disease.

[The author's speculations are certainly interesting, even stimulating, and there is nothing unreasonable about them as speculations. The ingestion of solid bodies by metazoon tissue-cells is a verifiable phenomenon, not unfamiliar, and some varied experimental work in this direction would be a good deal more convincing than the evidence —which cannot but be affected by the personal equation—of stained films. The origins of big things lie too deep to be revealed to simple inspection in one field, and it is good in these days of hustle to remember the way that the greatest of natural philosophers of the Victorian age went to work :—

" When on board H.M.S. ' Beagle ' as naturalist I was much struck with certain facts. . . . These facts seemed to throw some light on the origin of species. . . . On my return home it occurred to me in 1837 that something might perhaps be made out on this question by patiently accumulating and reflecting on all sorts of facts which could possibly have any bearing on it. After five years' work, I allowed myself to speculate on the subject, and drew up some short notes ; these I enlarged in 1844 into a sketch of the conclusions, which then seemed to me probable: from that period to the present day (1859) I have steadily pursued the same object. I hope that I may be excused for entering on these personal details, as I give them to show that I have not been hasty in coming to a decision."—Darwin : Origin of Species, Introduction.]

A. A

REVIEWS AND NOTICES.

PHISALIX (Marie). **Animaux venimeux et venins: la fonction venimeuse chez tous les animaux; les appareils venimeux, les venins et leurs propriétés; les fonctions et usages des venins; l'envenimation et son traitement.** (In 2 Vols.) Vol. 1. pp. xxv + 656. With 232 figs. and 4 plates. Vol. 2. pp. xiii + 864. With 289 figs. and 13 plates. 1922. Paris: Masson & Cie., 120, Boulevard, Saint-Germain. [Price 120 fr. net.]

The name of Phisalix is so well established among all who are interested in the subject of animal venoms that this monumental work by the widow of a distinguished pair of life-long collaborators of that name is assured of a cordial and respectful welcome, apart from its singular merits as—in the words of the lamented LAVERAN, who has graced it with an appropriate introduction—the most comprehensive and complete volume existing in any language on the science of animal venoms. Here, indeed, we find collected and compiled in upwards of 1,550 pages all the known facts about venomous animals, the term venomous being used in a very wide sense to include, at the one extreme, toxins like those of the pathogenic Protozoa, of which the existence is inferred rather than demonstrated, and, at the other extreme, tangible venoms like those of snakes, which have been both the subject of erudite study and the object of vulgar astonishment.

In the presentation of the subject each zoological phylum, or group of associated phyla, is independently treated in brief historical and zoological perspective, in appropriate anatomical detail, in the physiological, biochemical, and pathological aspects of its specific venoms, and in congruent bibliographical narrative. The outlook of the work is thus almost purely scientific, though accidents and their treatment are not disregarded. The text is bountifully illustrated by figures and is adorned by some plates of singular perfection.

In reviewing this vast array of facts it best conforms with the aims of this *Bulletin* to follow them as they are presented, group by group.

The fourteen pages on venomous PROTOZOA present nothing particularly remarkable—the trichocysts of Ciliates, the toxin of Sarcocystis, the problematical toxins of the suctorial tentacles of Acinetaria, of protozoon blood-parasites, and of Entamoeba. Of the last-named the account is out of date; it is treated as unconditionally pathological and separately from *E. tetragena.*

The COELENTERATA occupy 62 pages. Here also we are a good deal on familiar ground—the thread-cells of medusae and polyps, the local and general effects of accidental contact with jellyfish (*Cyanoa* and *Rhizostoma* in particular), Portuguese man-o'-war (*Physalia*), and the sea-anemone associated with sponge-fishers. GUERIN's experiments with dried and powdered Physalia are described; the powder when ingested by animals such as the dog and cat and rat caused symptoms of abdominal distress, vomiting, and often death in convulsions 12 to 48 hours afterwards. The various toxins that have been obtained from notoriously urticant coelenterates, and their physiological effects, are described. The bibliography of stinging-cells and their toxins contains over 100 references.

ECHINODERMS take up 32 pages, wherein are described the structure of pedicellariae and their venom glands, and the toxins obtainable from the ovaries and testes of sea-urchins. The experiments of HENRI and KAYALOFF are quoted as illustrating the toxic effects of pedicellaria-glands; 40 pedicellariae of *Sphaerechinus granularis* crushed in saline and injected into young rabbits of about 1,500 gm. weight caused death by general paralysis and asphyxia in two or three minutes, the heart continuing to beat after cessation of breathing.

The 76 pages on PARASITIC WORMS are mainly helminthology and pathology, with the toxic aspects of helminth infestation and the applications of serum diagnosis elaborated.

In the 30 pages devoted to MYRIAPODS the cutaneous glands of millipedes and the venom glands of centipedes are described, and some of the conflicting statements regarding the effects of the bite of centipedes are mentioned. CORNWALL's excellent paper on the venom of centipedes (*Ind. Journal Med. Research*, Vol. 3, 1916) is not noticed.

To ARACHNIDA 108 pages are allotted. Here 20 pages are given to the structure and development of the venom apparatus of scorpions and spiders, and 40 pages to different species of spiders and their venom, but only 18 lines altogether to ticks and mites. Scorpion venom is very fully considered in all its scientific aspects. The venoms of scorpions, like those of snakes, are specific ; those of some species have analogies with cobra venom, those of others with viperid venom ; the venom of a particular species also varies with individual circumstances : these facts no doubt explain the prevalence of controversy regarding the results of sting from a scorpion. Experiments here quoted show that a full-grown guinea-pig may be quite insensible to a dose of 2 mgm. of (dried) venom of a *Heterometrus* (Scorpionid) and be quickly killed by 0·10 mgm. of that of a species of *Buthus*. Scorpion-venoms, like snake-venoms, can be dried and subsequently dissolved in water or saline without loss of virulence. The action of spider-venom is known chiefly by its effects in accidents, but among other things a very full account is here given of ESCOMEL's experimental and clinical observations of that of *Lathrodectes mactans* and of *Glyptocranium gasteracanthoides*. Perusal of these pages will correct any lingering incredulity as to the possibility of serious results from the bite of a spider.

Venomous INSECTS fill 150 pages, of which the stinging Hymenoptera occupy more than a third. The less familiar matters dealt with are the toxins of Oestrid larvae, of urticating caterpillars, and of vesicating beetles, and the experiments of Dr. C. Phisalix on the limited amount of " immunity " afforded by hornet venom against the venom of the viper.

Venomous and poisonous MOLLUSCA are dealt with in 21 pages. Here the salivary glands of the octopods and cuttle-fishes are described ; their secretion is now known to be venomous, quickly and totally paralysing its natural prey after violent preliminary convulsions, and killing warm-blooded laboratory animals in the same way. The salivary secretion of some of the gastropod Molluscs—*Conus* in particular—has long been believed venomous, but nothing very definite is here said on this point. Certain gastropod and bivalve molluscs are dangerous to eat quite apart from any temporary contamination of the water from whence they may have been taken ; this is particularly the case with mussels, from which a leucomaine, mytilotoxin, has been separated.

Venomous and poisonous FISHES are examined in 143 pages. The venomous species are defined as those that can inflict a serious wound with spines or—as in the case of some eels—with teeth. More than 60 such species are here mentioned, including piked dog-fish, the sting-rays and eagle-rays so abundant in tropical seas and estuaries, cat-fishes (Siluridae), Scorpaenids, Cottids, Trachinids, toad-fishes, blennies, gobies, globe-fishes and porcupine-fishes, besides several families of Perciform fishes ; the venom-apparatus and venom of the more notorious species are dealt with in detail.

A second section of this chapter treats of fishes of which the blood is toxic. Of these there are numerous species, besides the eel. The physiological action of ichthyotoxin is here discussed at great length.

A third section deals with poisonous fishes, which are defined as species that either persistently or periodically elaborate substances causing grave or even fatal consequences to man if the flesh be eaten. This definition is meant to exclude fish that perhaps may accidentally become poisonous through some local peculiarities of their food or feeding-grounds, and fish that may become quickly ptomainous in a tropical climate. Of the fish considered to be truly poisonous by the definition, over 120 species are here listed and a few figured. They include species of the following groups and families :—Lampreys, sharks, rays, sturgeons, Clupeoids, Cyprinoids, Siluroids, eels, pike, Cyprinodonts, gar-fishes, barracudas, Gadoids, sea-perches, sea-breams, wrasses, mackerels, horse-mackerels, Pleuronectoids, gobies, Scorpaenoids, toad-fishes, frog-fishes, file-fishes, box-fishes, parrot-fishes, globe-fishes, porcupine-fishes, and the sunfish; some of these, of course, are repulsive looking creatures, and carry the stamp of forbidden food. In respect of the flesh of some of these fishes individual idiosyncrasy no doubt may play a large part.

Venomous AMPHIBIA are treated in 174 pages. The structure and distribution of the venom glands of the skin of the various Amphibia are described. These glands are of two kinds, namely (1) the small *mucous glands* disseminated all over the body, and (2) the *granulous glands* (of which the " parotid " glands of the toad are a good example) which are massed in definitely-arranged formations usually on the dorsal surface of the body. A long account is given of the venoms of both kinds of glands, upon which Madame Phisalix herself is an authority. The " mucous " venoms have a strong analogy with viper venom, and according to C. and M. Phisalix frogs immunized to the former are resistant to the latter; also rabbits immunized to mucous venom of salamander become to a limited extent refractory to the virus of rabies. The " granulous " venoms are secreted with more physiological labour; their properties differ in different species of Amphibia. Space does not permit us to notice the several specific granulous venoms here described and discussed at length: it may be sufficient to mention that that of the toad is extremely toxic to both cold-blooded and warm-blooded vertebrates, causing shock, slowing of heart and eventual stoppage in systole, nausea, vomiting, myosis, muscular spasms followed by paralysis and failure of respiration; and in warm-blooded animals causing also a fall of temperature.

Venomous LIZARDS (*Heloderma*) engage 45 pages, 16 of which are given to anatomical details. Here, as on the Amphibia, the author draws freely from her own original researches, and she writes with a particular authority from vivid personal experience, having been bitten by a captive Heloderma sixteen inches long. The bite was extremely painful and the bitten finger became swollen and purple. Profuse sweating and vertigo followed in a few minutes. About an hour afterwards, along with a return of sweating and giddiness, a brief fainting-fit occurred. The sweating and the tendency to faint lasted about three hours. Local pain continued for about a week: general asthenia with fits of vertigo, sweating, and sensations of swoon lasted about five months. The author states particularly that there was no nervous shock.

The dramatic interest of this chapter is maintained by an account of a mortal combat between a Heloderma and a large viper. The Heloderma, bitten in the cheek, died after 24 hours, with the usual lesions of viper poisoning. The viper, bitten in the tail, and consequently without injury to any viscus, died after 52 hours.

Venomous SNAKES engross 598 pages, of which 22 are given to classification and superficial characters, and 94 to lists and some brief diagnoses of species, arranged according to geographical provenance; here, among the Asiatic species, we find the notorious *Bungarus candidus* (=*caeruleus*) listed, indeed, but not otherwise noticed. Anatomical details of the venom apparatus and the associated structures fill other 124 pages, and the rest of this big section is devoted to snake-venoms—their properties, physical and chemical reactions, and specific composition; their specific physiological and pathological effects; the action of specific toxins and ferments on the blood and several tissues; immunity, antivenoms, etc.; and, finally, to treatment of snake-bite, with which is incorporated an account of the various reputed specifics and curatives that have been advocated in different parts of the world. It must be remarked that venomous snakes and snake-venoms are defined in the widest sense, so as to include not only the Viperidae and the proteroglyphous and opisthoglyphous Colubridae, but also a number of aglyphous Colubridae, Boiidae, Ilysiidae, Uropeltidae, and Amblycephalidae, which, though not possessing grooved fangs, are known to possess either a parotid or an anterior temporal gland; the secretion of the gland is toxic, although there are no special means of injecting it.

The only MAMMAL known to possess a venom apparatus—the male *Ornithorhynchus paradoxus*—occupies 10 pages, compiled from well-known authorities on the subject.

In the final chapter, as also in the introduction to the first volume, the functions and uses of animal venoms are discussed. That in many species the venom is useful for gross attack and defence is obvious, and that venoms may aid in that more subtle form of cellular defence which leads up to natural immunity is most probable; it is more than probable also that they may have various kinds of stimulative influence, like other secretions. The author enlarges on all these points, but does not here say anything about the probable digestive functions of the venom of snakes. She maintains rather a biological outlook, both broad and subtle, and is inclined to regard the manufacture of toxin as a primitive function of general prevalence, and the obviously and potently venomous animals in each zoological group as merely a sort of specialized or privileged caste. To the cynic it may, perhaps, be some satisfaction to reflect that in Nature's livery we all are more or less toxic.

This final chapter ends with some remarks on the therapeutic employment of animal venoms in ancient and modern times, and with an expression of hope that uses may still be found for snake venoms in rational therapeutics—a hope that seems quite justifiable.

This great magazine of well-ordered fact will be a very present help to explorers in a field which, to residents in tropical countries in particular, is of fascinating interest.

A. Alcock.

RODENHUIS (Y.). **Handleiding bij het onderzoek naar Protozoën in de menschelijke faeces voorkomend.** [Manual for the Investigation of Protozoa occurring in Human Faeces.]—*Koloniaal Instituut, Amsterdam.* Mededeel. No. XVI (Afdeeling Tropische Hygiene No. 11). pp. iv+68, 8 plates. 8° Amsterdam. 1921. [Published by the Institute. Price fl. 3.]

In this small and clearly written manual the author has endeavoured to give a concise account of the chief methods employed for detecting protozoa in human faeces; and he has tried, at the same time, to describe these organisms in sufficient detail to enable the inexperienced worker to sort out, classify, and name his findings.

The work is divided into three main chapters, followed by an elaborate tabular key for the systematic determination of the various protozoa described, together with eight double plates, exhibiting 86 half-tone figures of protozoa and other organisms, and a series of curves.

Chapter I deals with the technique of collecting and examining faecal material. The various methods in vogue for making fresh and permanent preparations are briefly reviewed, and three procedures are described for concentrating cysts, when present in scanty numbers in the stools. The last of these—a method devised by BAYER in KUENEN's laboratory in Amsterdam—is worthy of note, as it is not generally known.

The technique is as follows :—1 cc. of faeces is put into a small flask (capacity about 100 cc., and fitted with a rubber stopper), together with 30 cc. of the following solution :—

Cupric chloride	0·6 gm.
Cupric acetate	0·6 gm.
Formol	30·0 cc.
Camphor water	150·0 cc.
Glacial acetic acid	4·0 cc.
Distilled water	420·0 cc.

The mixture is thoroughly emulsified, and then sieved through fine wire netting or gauze to remove the larger particles. The filtrate is then shaken up in a separating funnel with 15 cc. of ether and allowed to stand for several minutes, when most of the faecal detritus rises to the top along with the ether. The liquid remaining below is then drawn off and centrifuged (for three minutes, by hand, at a moderate speed), and the deposit examined under the microscope. A drop of carbolthionin solution (Nicolle) may be added to the preparation to make the structure of the cysts more distinct; but in the author's experience this is superfluous.

Various well-known methods of fixation and staining are described, but it seems regrettable that no indications are given of their relative values. Some of them are good, but others are, to say the least, poor; and one (drying and staining with methylene blue and eosin) is utterly worthless for studying active protozoa or their cysts in human faeces.

Chapter II contains a few notes on points of diagnostic importance in identifying intestinal protozoa (form, motility, dimensions, structure, etc.).

Chapter III is the longest, and forms a synopsis of the protozoa found in human faeces. Six amoebae, four flagellates, four coccidia, and *Balantidium* are here shortly described. The descriptions are, on the whole, adequate and free from errors, but they contain a few statements which are open to more or less serious criticism. Zoological conventions in the matter of nomenclature are not always, apparently, accepted by the author. We thus find the *Trichomonas* of the gut called "*T. intestinalis,*" *Giardia* called "*Lamblia,*" and various authorities and names wrongly cited. For example, the reviewer noted, with some surprise, a coccidium named "*Eimeria wenyoni* (Wenyon)"—which unjustly implies that the authority cited named the organism after himself; whilst *E. snijdersi*, a name which the reviewer once proposed, is listed as "n. sp.," implying, of course, that the name is here first introduced by Rodenhuis. These, and several other zoological inaccuracies, might have been avoided if the author had sought competent zoological assistance, and had made himself familiar with the rules of nomenclature. They seem all the more regrettable in view of the fact that several works which should have saved him from falling into such errors are cited in his list of references.

As regards matters of fact or interpretation, the reviewer notes several statements which he regards as incorrect. The author is, apparently, unaware of the part played by the precystic forms in the life-cycle of *E. histolytica*, and KUENEN and SWELLENGREBEL's interpretation of "*E. minuta*" is adopted—an interpretation which is surely no longer tenable. The work of WALKER and others, in this connexion, is ignored. In common with other Dutch workers, the author regards all the strains of *E. histolytica* forming small cysts as belonging to a separate species called "*E. tenuis.*" [Even if this were a correct conception, this would not be the correct name to employ.] The various strains of *E. histolytica* are dismissed with the remark that "too little is known of the influence that different factors may have on the dimensions of cysts, for it to be possible to ascribe these differences, with certainty, to a diversity of race." [Such a statement merely ignores the bulk of the evidence adduced by English workers as a foundation for their views; and Rodenhuis's curves —which are given on Plate VIII—cannot be regarded as constituting a serious criticism of their far more detailed and extensive investigations.] It may be noted further that *Iodamoeba* is—as by other Dutch workers—here assigned to the genus *Endolimax*. [Whatever views one may hold as to the naming of this organism, it is certainly not co-generic with *E. nana*—the type species of *Endolimax*.]

Among the flagellates, *Embadomonas* is not described, and is dismissed (under the name of *Waskia*) as a "doubtful" form. [This is certainly a mistake.] "*Tricercomonas*" is included in the same category, but *Enteromonas* [probably the same organism] is described and apparently accepted. The statement that CHALMERS and PEKKOLA have described cysts of this flagellate measuring 4μ in diameter exceeds the observations of these authors, who merely suggested tentatively that certain rounded forms observed might be precystic stages [though, in the reviewer's opinion, they probably were not]. They neither found nor described cysts. The coccidia are described so briefly as to be little more than mentioned, and not one of the four species noted is named quite correctly.

The concluding 8½ pages of the text are taken up with a complicated tabular key for the identification of the various protozoa enumerated in the preceding chapter. [This appears to the reviewer to have but little practical utility, since only normal or typical forms are considered, and it must be assumed, presumably, that the user of the key knows beforehand that the object to be identified is a protozoon. Such a key is too cumbrous for the protozoologist, who, when he recognizes an object as a protozoon, also knows approximately what sort of protozoon it is; while the beginner, who finds a doubtful "protozoon" in a stool, is almost certain to be led astray or into grave difficulties. For example, a squamous epithelial cell could easily be diagnosed, by an inexperienced worker, as some species of amoeba if he attempted to "run it down" in this table.]

References (63 in number) are given to some of the more recent works consulted—no mention being made of many of the fundamentally important papers on the subject [such as that of WALKER and SELLARDS]. Other bibliographic defects are also unfortunately frequent, and not a single reference is given with full bibliographic data. Moreover, both here and in the text, several proper names are misspelled (*e.g.*, "Alexieff" for ALEXEIEFF, "Swezey" for SWEZY, "Malins and Smith" for MALINS SMITH), and more careful proof-reading would have eliminated occasional typographic errors, which occur throughout. The figures illustrating the text, though numerous, cannot be highly commended; though their shortcomings—from the artistic as well as from the cytological standpoint—seem to have been needlessly exaggerated by the excessive magnification (4,000 diameters) at which they have been reproduced. Several of them, such as the figures of *Balantidium* and *Enteromonas*, convey a very imperfect idea of the structure of the organisms which they are intended to depict.

A highly satisfactory feature of this publication is its numerous omissions, though it is not clear whether these have always been intentional. A considerable band of text-book die-hards—such as the mythical species of "*Cercomonas*," "*Prowazekia*," etc., of the human gut—are here ignored; and as these have been kept alive, in the past, only by frequent transplantation from book to book, one may perhaps venture to interpret this as a hopeful sign that the days of some of the more hardy among them are now numbered. The almost complete absence of reference to the coprozoic protozoa of human faeces is, however, an omission which seems a mistake in a work of this character.

On the whole this little work may be said to fulfil the purpose for which it was designed, though it cannot be regarded as an authoritative zoological guide to the animals with which it deals; and while many workers in the tropics—if they read Dutch—will, therefore, find it a useful laboratory manual, nevertheless they will have to turn to many another work on the same subject if they desire to do more than merely name, more or less correctly, the objects which they find in the protozoological examination of human stools.

Clifford Dobell.

RAVAUT (Paul). **Syphilis, Paludisme, Amibiase. Le traitement d'attaque et les traitements secondaires (préventif, abortif et d'entretien).**—ix + 213 pp. 1922. Paris: Masson & Cie, Éditeurs, Libraires de l'Académie de Médecine, 120, Boulevard Saint Germain. [Price 9 fr. net.]

A useful and suggestive little volume by a well-known author dealing with the therapeutic treatment of syphilis, malaria, and amoebiasis. At first sight the grouping together of three diseases, so different in aspect, appears unusual, and this procedure would not find acceptance with biologists, but the figure of speech on page 15 of *Spirochaeta pallida* "encysting itself" in certain regions indicates that the work is written with clinical rather than strictly biological intention. The war enabled Dr. Ravaut to study chronic malaria and amoebiasis on a large scale, as he had already studied syphilis, and on the common ground of parasitism and clinical evolution he treats them all together.

There is here nothing new or original in the treatment of the acute manifestations of malaria and amoebiasis, nothing to appeal greatly to practitioners dealing with tropical diseases in countries where they originate; the book nevertheless will be of interest to a large number of medical men on this side of the channel.

EHRLICH's Therapia Sterilisans Magna doctrine finds no disciple in Dr. Ravaut, who ardently holds that a complete cure is to be sought on well-considered lines and by the prolonged use of remedies after the causal organism has been silenced by specific drugs; but EHRLICH's theory that in trypanosomiasis one strain of an organism may be "fast" to a drug which acts as a specific to another strain of the same organism Dr. Ravaut vigorously applies to syphilis, amoebiasis and, in a lesser degree, to malaria. He maintains that the combination of two or more drugs complementary renders them less toxic and more efficient; that, for instance, in the treatment of syphilis the maximum efficacy and safety is obtained by the simultaneous use of novarsenobenzol and mercury. With regard to safety, English operators have had remarkable freedom from the untoward incidents which sometimes attend the intravenous administration of N.A.B., especially hepatic, by giving glucose before or with the injections.

Dr. Ravaut lays down definite rules of treatment for syphilis, but holds the pessimistic view that no one can be said to be cured. The negative Bordet-Wassermann reaction must be obtained and maintained, but the Bordet-Wassermann reaction is unreliable for the direction of treatment. The fallibility of the Wassermann test on the blood may be admitted, but Dr. Ravaut's severe criticism goes rather too far in the opposite direction and tends to shake confidence in a laboratory aid which, when considered with clinical facts, serves a useful purpose. He uses the cerebrospinal fluid for the Bordet-Wassermann tests. He says there is no way of estimating the intensity of the infection in syphilis; of the modification of the Sachs-Gorgi reaction by Vehrne, or the Dreyer-Ward method, no mention is made.

In malaria he holds that cases which have not been "sterilized" before the Plasmodium has taken refuge in the deep organs require rigorous and sustained treatment. Like English authorities, he regards quinine as the only specific; its failure is due to its non-absorption or to insufficient dosage. He might have added a third cause of failure, absorption at irregular intervals and in varying amounts. He disapproves of intramuscular and subcutaneous injections. Intravenous injections are excellent, but require the daily attendance of a doctor. Quinine by mouth and in solution is the most practical and convenient method.

In the treatment of haemorrhagic forms of malaria (including haematuria) small doses of N.A.B. given intravenously in association with quinine by the mouth have given him excellent results.

In the laboratory examination of malaria Dr. Ravaut does not appear to lay great stress on the differential count of the white blood cells. The value of the relative proportion of the large mononuclears in chronic malaria has lately been questioned by certain English and American workers, and on this point Dr. Ravaut's views in more detail would have been interesting.

Amoebiasis, he states, was considered an alien disease before the war, and was therefore overlooked in France, as in England. The value of microscopical and other examination of the faeces, both for diagnosis and treatment, has not been sufficiently recognized. In the treatment of this disease methods and drugs should be well chosen. Emetine is appropriate only for the acute stages, and Dr. Ravaut regards Bismuth-Emetine-Iodide as an unpleasant drug for the robust and a dangerous one for the weak; he has not obtained from it the good results of some English observers. Intravenous and intramuscular injections have little effect on the cystic forms of the parasite. Arsenic by the mouth (especially N.A.B.) is very useful.

Ipecacuanha is sometimes more thorough and lasting in its action than emetine. "Ravaut's Paste" is fully described, and the author claims that used on alternate days with N.A.B. (by the mouth) on intervening days, it is really efficacious in chronic amoebiasis, including "carriers" without symptoms. Practitioners in England who have used Ravaut's paste will probably endorse his opinion.

Dr. Ravaut lays little stress on bed and diet in the treatment of chronic amoebiasis. Eggs, milk, and uncooked vegetables are harmful; otherwise a patient may have what he likes and can digest. There is probably a good deal of wisdom in this; the general condition of the patient must be studied.

One is struck when reading the book by the rarity of the references to recent work of English writers, an omission probably due to the fact that the author does not know English.

One welcomes the appearance of this little treatise, with inexpensive cover, clear print and quite good enough paper, which can be purchased for as small a sum as nine francs.

J. B. Christopherson.

EPPS (William). **Anderson Stuart, M.D., Physiologist, Teacher, Builder, Organizer, Citizen.**—pp. xi + 177. With 21 plates. 1922. Sydney: Angus & Robertson Ltd., Publishers to the University. [Price not stated.]

This is an interesting record of a man in whom high intellectual endowments and attainments were combined with imagination and with extraordinary force of character, to the benefit of his fellow citizens and also of the medical profession in New South Wales.

After a distinguished career at Edinburgh University, where, as a student, he gained the Ettles scholarship for the first place on the list of medical graduates of his year, Thomas Anderson STUART was appointed Professor of Anatomy and Physiology in the University of Sydney. On joining his post in 1883, he found a medical school in merest rudiment—his "chair" was located in one of the four rooms of an unfinished cottage that gave the school a local habitation; his staff consisted of a superannuated coach-driver who did not mind handling dead bodies; his teaching apparatus seems to have been represented by a borrowed skeleton; and his class was composed of four students. He appears to have faced the situation with extraordinary spirit and determination, for in six years' time he was teaching a class of from 50 to 60 students in a well-equipped annexe to the University, which annexe had come into existence, "a handsome structure in Tudor Gothic," mainly as a result of his own initiative and pertinacity: out of the four-room rudiment had been developed a medical school worthy of a university. But this, for Anderson STUART, was only a beginning. In 1908 he was planning additional buildings, which ultimately doubled the size of the medical school; and by 1920—the year when this remarkable Professor and Dean of the Medical Faculty died—the school provided accommodation for 1000 students and the requisite teaching establishment, and had indeed become "the largest medical school in Australia," comparing "very favourably with the great medical school buildings of the United Kingdom." Long before this his purely professional responsibilities had become confined to the single subject of physiology.

Other public activities—academic, sanitarian, educational, social—occupied a large amount of this notable life, but the creation of this medical school and, incidentally, the development of its clinical strength in a magnificent extension of the Royal Prince Alfred Hospital is the great achievement and the monument.

The spirit and ideals that animated this great achievement are well illustrated in the following autobiographical passage: "I believe that my influence in this direction has been of considerable value to the profession of medicine, in raising it to its present high standard and social influence in Australia, where it occupies a leading position. In Australia the medical man has been a university graduate from the very beginning, and there have been no colleges or corporations of secondary importance to mar the influence of the university. In my opinion the general level of professional capacity in Australia is much higher than it is in the old country, partly because of the generally higher education of the medical man and partly from the fact that so many medical men are thrown upon their own resources by reason of their isolation . . . hundreds of miles away from specialists."

The author of this "Life" says that no enterprise designed or organized by Sir Thomas Anderson STUART, has ever -once accepted—had to be abandoned or materially altered in execution, so clear was his foresight and so comprehensive was his attention to detail. It is perhaps unfortunate that his scheme of a Department of Tropical Medicine in connection with the Medical School of the University of Sydney was not accepted.

A. Alcock.

The Practice of Medicine in the Tropics. Edited by BYAM and ARCHIBALD. Vol. II.

The writer desires to correct an error he has made in his review of Byam and Archibald's "Practice of Medicine in the Tropics," which appeared in the last issue of the Bulletin, page 535. This has reference to the dates quoted in the article on Spirochaetosis by Archibald. The date of EHRENBERG's creation of the genus *Spirochaeta,* as pointed out by DOBELL (1918) [On the Nomenclature of the Spirochaete of Syphilis. *Medical Research Committee, Special Report Series,* No. 19, p. 47 (London).] is correctly stated as 1834. EHRENBERG's paper was read in 1832, but was not printed till May, 1834, though EHRENBERG himself (1838) incorrectly quotes it as 1833. The date on the title page of the volume (*Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, Aus dem Jahre 1833*) is given as 1835. It appears that EHRENBERG's paper was printed and issued separately in May, 1834, and not incorporated in the volume till 1835.

KLEBS' genus *Spironema* was founded in 1892, not 1893. The paper (*Flagellatenstudien I—Zeit. Wiss. Zool.*, Vol. 55, Heft. 2, pp. 265–351) is included in the volume which bears the date 1893, but this and other papers in the volume appeared on December 20 1892, and were included in the 1893 volume. The second part of the paper (*Flagellatenstudien II—Ibid.*, Heft. 3, pp. 333–445) appeared on December 30, 1892.

The writer very much regrets having criticized the date 1834, which Archibald correctly quotes. The main point, however, stands: it was not the genus *Treponema* which KLEBS founded, but the genus *Spironema*

C. M. Wenyon.

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RECENT WORK ON THE PATHOLOGY OF BLACKWATER FEVER: A CRITICAL REVIEW.

By WARRINGTON YORKE, M.D.,

Sectional Editor, Tropical Diseases Bureau.

Although during recent years a considerable number of papers dealing with blackwater fever have been published, very few of them are of any scientific value, and our state of ignorance regarding this important disease is almost as great as it was ten to fifteen years ago.

Broadly speaking, recent communications on blackwater fever can be grouped into the four following classes :—

1. Papers of an essentially clinical nature, in which are recorded, sometimes in remarkable detail, the various symptoms and signs observed by the author. Such papers, which have appeared to the reviewer as merely unnecessary, are, in the majority of instances, the efforts of those who have but recently visited the tropics—usually as the result of the War—and whose interest has been aroused by this most impressive disease. Knowing little or nothing of the condition and having no access to literature beyond one or two textbooks, they have not hesitated to commit their observations and impressions to print, failing perhaps to realize they are simply repeating what has been written over and over again during the past twenty years.

2. Papers mainly concerned with the endemicity of the disease. In these an attempt is made to show by statistics the relation of the disease to malaria or to the various kinds of malaria infection, to quinine, or to the length of sojourn in the tropics, to map out its race incidence, and so forth. These papers almost invariably fail to be of value because the information they contain is deficient in one or more essentials. All work on endemicity must be based on a census of the population, and this is practically never forthcoming. How often do we read of statements to the effect that the liability to an attack of blackwater fever is greater in persons infected with malignant tertian parasites than in those infected with simple tertian or quartan parasites, or that blackwater fever is more likely to occur amongst those who have been a certain length of time in the tropics than amongst those who have been a greater or less time. These statements are based on the particular parasites present in so many cases of blackwater

fever, or on the fact that the greatest number of cases of blackwater fever were found amongst those who had lived in the tropics for a certain length of time. As STEPHENS (1922) has recently pointed out, no conclusions regarding liability to attack can be drawn from data of this sort unless we have the population data as well. That is, before we can state that the liability to an attack of blackwater fever is greater in persons infected with malignant tertian parasites than in those infected with the other malaria parasites, we must know not only the particular parasites present in the blackwater cases, but also the number of persons infected with each of the three varieties of parasites in the region under consideration. For example, if malignant tertian malaria is nine times as frequent as quartan in a certain district, then the observation that malignant tertian parasites were found in 90 per cent. of blackwater cases and quartan parasites in only 10 per cent. obviously does not warrant the conclusion that malignant tertian malaria renders a person more liable to an attack of blackwater fever than does quartan malaria ; but if, on the other hand, the malaria census of a district shows that malignant tertian and quartan are approximately equally common, then an observation that malignant tertian parasites were found in 90 per cent. of blackwater cases and quartan parasites in only 10 per cent. would warrant the conclusion that malignant tertian malaria renders a person more liable to an attack of blackwater fever than does quartan malaria. Similarly, an observation to the effect that 60 per cent. of the cases of blackwater fever in a certain colony occurred amongst persons who had been two years in the colony and only 10 per cent. among those who had been five years in the colony does not warrant the conclusion that one is more liable to malaria during his second year of sojourn in the colony than during his fifth year, unless we have information regarding the length of sojourn of the susceptible population in the colony. If such a census should show that six times as many persons were in their second year of sojourn in the colony as there were in their fifth year, then the liability to blackwater is really the same in the second and fifth years.

3. Papers dealing mainly with the treatment of the disease. Such papers are in the main without any value and the claims made quite unjustifiable. Time and again papers have appeared in which a more or less complicated line of treatment is described in detail, and then it is naïvely recorded that several cases were treated successfully by it. The authors are apparently blissfully ignorant of the fact that about 75 to 80 per cent. of cases recover whatever treatment be adopted, and that in view of this the fact that three or four cases have survived any particular drug or combination of drugs is merely a *post hoc* phenomenon and does not justify the belief that they have survived because of the drugs administered.

4. Papers dealing with the pathology of the disease. This group comprises a relatively small proportion of the total papers, and it is with it that I propose to deal mainly in the present review.

Nearly two years ago A. PLEHN (1920) published a most interesting paper on the genesis of blackwater fever. In the introductory portion of his paper PLEHN states briefly that there is in German scientific circles no longer any doubt but that blackwater fever is merely a complication of malaria : the presence of malaria parasites in the body is essential for the development of blackwater fever. Owing to repeated destruction of parasites during the febrile attacks, the body becomes super-sensitive to the malaria parasite protein. When this super-sensitiveness has attained to a sufficiently high degree, a further solution of quite a small number of parasites may precipitate the crisis ; but, as a rule, however, this only occurs when numerous parasites are suddenly destroyed. In most cases the decisive cause of the destruction of the parasites is quinine, but sometimes it is some other drug given as a substitute for quinine or merely with a view to combating symptoms, *e.g.*, tuberculin, antipyrin, phenacetin, phenokoll, methylene blue, salvarsan, atophan, and the application of X-rays to the spleen ; in quite rare cases there is no recognizable cause, even the constitutional disturbances due to cold, wet, wounds, or over-exertion, etc., being absent. The sole essential for the production of blackwater fever is an acute dissolution of a certain number of malaria parasites. The condition of super-sensitiveness appears to be transitory and it becomes compensated through antibody formation by the organism.

PLEHN does not in this paper discuss the evidence supporting the view that blackwater fever is of malarial origin, and the subject is outside the scope of this critique, but attention might here be drawn to an admirable article by STEPHENS (1913), in which the question is fully considered.

The main portion of PLEHN's paper deals with the mechanism by which two of the most important symptoms of the disease are produced, viz., haemoglobinuria and jaundice. In conducting this enquiry PLEHN attempts to answer three questions :—

1. Where does the haemolysis take place ?
2. What is the origin of the casts in the renal tubules ?
3. How is the jaundice produced ?

With regard to the first of these questions, PLEHN reaches the conclusion that there is no evidence that haemolysis takes place in the blood-stream, because, firstly, haemoglobinaemia is not, as a rule, present in blackwater fever, PLEHN himself failing to find haemoglobin in the serum even at the time of maximum haemoglobinuria ; secondly, haemolysin is not found in the blood of blackwater fever patients ; and, thirdly, there are no indications of changes in the red blood cells, *e.g.*, shadows, etc., which might be expected if 60 80 per cent. of the red cells were destroyed in the blood-stream within 24 hours

PLEHN further finds no support for the hypothesis that haemolysis takes place in the organs which are commonly supposed to be concerned with the physiological destruction of erythrocytes, *e.g.*, spleen, liver and bone marrow, the capacity of which in this direction might be supposed to be increased in blackwater fever, especially if directed against erythrocytes of lowered resistance. The blood destruction is too great and too quick to be explained by the chronic pathological changes seen in these organs in old malaria patients. Again, the weight of evidence does not support the view that the blood-forming organs are exhausted as the result of being continually called upon to replace the destruction due to malaria, as experience has shown that chronic blood destruction by poisons has the contrary effect— increasing and not decreasing new cell formation. The resistance of the erythrocytes in blackwater fever to anisotonic NaCl solutions is lessened in only a proportion of cases—sometimes it is increased ; and, furthermore, such changes are specific only to NaCl solutions, and do not necessarily hold for blood poisons such as saponin. Finally, if haemolysis did take place in the organs in question, then the haemoglobin in order to reach the kidneys must pass via the circulation, and, as already remarked, this does not occur.

All these considerations, states **Plehn**, allow of scarcely any other possibility than that the haemolysis takes place in the kidneys. After remarking that nothing is known concerning a haemolytic function of the healthy or diseased kidneys, and that, as a general rule, there is no sign of inflammation in the kidneys of blackwater patients, **Plehn** passes on to consider the second question, viz., what is the origin of the cylindrical plugs in the renal tubules? He points out that these consist either of agglomerations of round, structureless, more or less strongly acid-staining (eosin, picric acid) granules, which in the same conglomerate are of about equal size, but which vary in different plugs between the size of a red cell and that of fine detritus; or they consist of compact, almost homogeneous, cylinders which in parts show fine granulation, the affinity of which for acid dyes is mostly slight. **Plehn** considers that these plugs do not arise from the red blood cells, because these are almost invariably absent from the urine of blackwater patients, and because they take up stains to such a varying degree. The most generally accepted view is that they arise from coagulation of a highly albuminous, haemoglobin containing, exudate; but on this hypothesis it is difficult to explain why some of the plugs are uniformly more or less granular, whilst others, and apparently the oldest, are almost homogeneous. Weigert's fibrin and elastic stain does not show the fine network characteristic of coagulation. In order to solve this question, which, according to **Plehn**, is more than twenty years old, **Plehn** re-examined his collection of pathological material. He found that certain lines, which appeared to be the walls of capillaries, and in which endothelial nuclei could be clearly distinguished, bordered not only blood-vessels but also renal tubules which had lost their epithelium. Whether the basement membrane was disintegrated or whether it was so closely applied to the capillary wall as to be indistinguishable from it was undecided. The fragments of the epithelial cells are obviously the material from which the plugs are formed, as one can distinguish in the same kidney all stages from more or less loose epithelial masses, some of which still exhibit nuclei and some of which do not, to large granular and very fine granular, almost homogeneous, firm cylinders. This affinity for acid stains is due to saturation with blood-colouring matter; in the oldest plugs it is usually slight, but sometimes it is as strong as that of the blood-cells themselves. **Plehn** points out that these epithelial fragments are often not found in the place where they have undergone degeneration, but further down the tubules in a region where the epithelial wall is complete. It is noteworthy that these plugs are only occasionally seen in the urine, probably because the urine-stream in the affected tubules very soon is held up. The brown finely granular detritus found in the urine is likewise derived from disintegration of epithelial cells and not from the red cells.

If the renal tubules which contain these cylinders are followed backwards towards the glomerulus a point is often reached where a renal tubule appears to communicate directly with a capillary, *i.e.*, at a point where the epithelium has completely disappeared. It is noteworthy that the number of tubules which have lost their epithelium appears small in comparison with the quantity of plugs, but this is due to the fact that the former are easily overlooked.

As indicative of the functional disturbance of the kidneys in blackwater fever, the inability to excrete bilirubin is of the first importance; even in the most severe icterus bilirubin is not found in the urine, although it can readily be demonstrated in the blood serum. Moreover, notwithstanding the high albumen content even in conditions of oliguria, the specific gravity of the urine is extraordinarily low—urine of 1,005 and 1,004 is quite usual, and even 1,002 and 1,001 occur. The specific gravity of urine depends mainly in the first place upon its NaCl content, and in the second place upon its urea content. Finally, the functional insufficiency extends under certain circumstances to the excretion of water; oliguria is common, and complete anuria may occur with retention of all the waste products of metabolism.

From these considerations PLEHN concludes that: (1) owing to the loss of epithelium at various places along the renal tubules, and possibly also of the basal membrane, the relationship between the contents of the blood-vessels and renal tubules becomes abnormal, and under certain circumstances a direct admixture takes place; and (2) owing to its high degree of hypotonicity the renal secretion in blackwater fever has a haemolytic action, which normal urine has not.

With regard to the third question, viz., the method of production of the jaundice, PLEHN states that up to the present we have adhered to the hypothesis of its purely hepatic origin. Icterus cannot be due to obstruction in the large bile ducts, because the intestinal contents are usually rich in bile. Neither can it be explained on the assumption that a surfeit of free haemoglobin reaches the liver through the general circulation or through the portal system from the spleen, because, as already stated, haemoglobinaemia is usually absent from the general circulation and consequently cannot be produced in the spleen, because the path from the spleen to the kidneys, where it is excreted, is through the general circulation. The kidneys, moreover, where the solution of haemoglobin occurs, drain into the vena cava.

Recently, however, the exclusively hepatic genesis of the icterus has been questioned, and with good reason, since the so-called reticulo-endothelial cells—especially those of the spleen, but also those of the bone-marrow, lymph-glands and elsewhere, possibly even the blood-stream itself—are prominently concerned with the formation of bilirubin (LEPEHNE, 1919).

Probably the haemoglobin which is not directly passed out into the urine escapes back from the kidneys into the blood-stream and is taken up by these cells before it accumulates sufficiently to be recognizable. The reticulo-endothelial cells convert it into bile pigment and throw it back into the circulation, where the bilirubin accumulates, because the kidneys are unable to excrete it, and consequently it is deposited in the tissues, giving rise to icterus.

Perhaps, however, the mechanism is quite different, as we must bear in mind the fact that in many cases of malaria in the Cameroons bile is vomited by the litre without any considerable decrease in the haemoglobin content of the blood.

Sometimes in blackwater fever icterus is only very slight, and this is the rule in the worst cases, where the blood destruction is so great as rapidly to result in death without the development of icterus, and also in very slight cases, where the haemoglobinuria is only observed fortuitously and is not accompanied by other symptoms. The absence of jaundice in both these classes of cases can be explained on the assumption that the haemoglobin is completely excreted by the kidneys, none getting back into the circulation.

Summarizing PLEHN's theory of the pathology of blackwater fever, it appears to be briefly as follows:—

The primary lesion, resulting from a sort of anaphylactic shock in a malaria subject, is profound changes in the renal epithelium, which here and there becomes dislodged, and disintegrates, sometimes taking the basement membrane with it. These dislodged, degenerate cells (impregnated with haemoglobin) collect in the lumen of the tubules and form the casts.

These histological changes in the kidneys are accompanied by equally profound loss of function, the power of eliminating urea and sodium chloride, and even water, being greatly decreased. The inability of the kidney to excrete bilirubin is especially noteworthy.

As a result of the dislodgment and degeneration of epithelium and basement membrane, communication occurs between the capillaries and tubules, and owing to the absence of urea and salt the urine is hypotonic and lakes the blood. The jaundice is explained on the assumption that some of the haemoglobin escapes back from the renal tubules into the blood-stream, where it is at once taken up by certain reticulo-endothelial cells and converted into bilirubin, which is disgorged into the circulation, and, as the kidneys are unable to secrete it, deposited in the tissues.

This theory is not only ingenious and attractive, but sufficiently plausible to merit serious attention. In subjecting it to critical examination, we must obviously consider the premises on which it is based. It might at once be stated that PLEHN seems to have relied chiefly upon his own observations and on those of certain German workers, and has consistently ignored the work of foreign observers—particularly English and American—to which, with a single exception, no reference is made. Had PLEHN taken the trouble to familiarize himself to a greater extent with the work of others, it is probable that he would have avoided certain of the errors into which he has apparently fallen.

The fundamental premise on which the whole of PLEHN's theory rests is that, as a rule, haemoglobinaemia does not occur in blackwater fever. There is, unfortunately, astonishingly little in the way of precise information on this important question. So long ago, however, as 1901, STEPHENS and CHRISTOPHERS record that they observed haemoglobinaemia in two of their Sierra Leone cases and in another case it was doubtful; whether they examined for it in the remaining five cases is not stated, and no reference is made to the subject in the protocols of the cases. CHRISTOPHERS and BENTLEY (1908) write as follows :—

> "Examination of the blood in blackwater fever has shown without exception the presence of true haemoglobinaemia, demonstrated by the centrifuging of blood received into hypertonic citrate solution; the serum after clotting has also always shown haemoglobin, provided the haemoglobinuria was still in progress, but in both cases the amount was usually small and more or less masked by the extraordinarily intense yellow coloration of the serum. We have only once seen haemoglobin so great in amount as to give a rosy colour to the serum and its presence is generally only indicated by an orange tint. Owing to this fact it is difficult to estimate with accuracy the amount of haemoglobin present; but in most cases seen by us it does not seem to have been more than the equivalent of a 1 per cent. solution of normal blood. In the one case in which the serum was rosy red the percentage of haemoglobin was as high as a 3·75 per cent. solution of blood."

BARRATT and YORKE (1909) investigated this subject with extreme care, and made precise estimations of the amount of dissolved haemoglobin in the plasma of seven healthy persons, 21 suffering from malaria and other diseases, and in 17 cases of blackwater at various stages of the disease. In the healthy persons the amount of haemoglobin dissolved in the plasma varied between 0·1 per cent. and 0·15 per cent.* Among the 21 persons suffering from malaria, dysentery, etc., the amount of dissolved haemoglobin in the plasma ranged between 0·02 per cent. and 0·2 per cent., except in two cases of malaria, where the somewhat higher degree, 0·31 per cent., was observed. Among the 17 cases of blackwater 40 estimations were made. The observations fell into three classes : those made before, after, and during the passage of blackwater. In the first class, which includes only three observations, the percentage of dissolved haemoglobin was 0·3 or less ; in the second class, consisting of 19 observations, the percentage of dissolved haemoglobin was in 12 cases raised, lying between 0·3 and 0·95 . ; in the remaining seven observations it lay between the limits met with in health, viz., 0·09 per cent. to 0·25 per cent. With regard to the latter, it must be remarked that although in these observations the first specimen of urine voided after the examination of the blood plasma contained haemoglobin, it does not necessarily follow that the urine which was being excreted at the time of the examination of the blood plasma contained haemoglobin. It is possible, if not probable, that in some cases the haemoglobinuria had already ceased, although, owing to the relatively long intervals at which the patient passed urine, this did not become evident. BARRATT and YORKE sum up by stating that " In the observations made in blackwater fever, while the urine in the bladder still contained haemoglobin, an increased amount of dissolved haemoglobin was observed in most but not in all cases."

ARKWRIGHT and LEPPER (1918) record that in four of the ten cases of blackwater fever examined by them the serum was sufficiently coloured with haemoglobin to give a spectrum in a tube 0·3 0·4 cm. in diameter ; citrated plasma was examined in two of these cases and was also found to contain haemoglobin. The remaining six cases were not altogether satisfactory, because in three the serum was examined only a few hours before the haemoglobin ceased, in one during an intermission, in one after the haemoglobin had ceased, whilst the last, which was examined only a few hours after the haemoglobinuria had commenced, was a mild case. Further information is given regarding one of the four positive cases, ARKWRIGHT and LEPPER stating that in this case both the serum and the plasma were examined on the first and second day of the attack and both were a deep brownish crimson on each occasion. The colour was due to methaemoglobin, probably with some oxyhaemoglobin, and also, in part, to bile pigment.

DUDGEON (1920) found that the blood withdrawn from a vein in a case of blackwater fever may show evidence of haemolysis varying from a deep coloration of the plasma to a faint tinging. He adds that " the evidence of haemoglobinaemia rapidly disappears from the blood, so that this phenomenon may be overlooked unless the examination is made at the correct moment."

There is, hence, considerable evidence to show that haemoglobinaemia in amounts definitely exceeding that found in the blood of normal persons, or of persons suffering from malaria, dysentery, etc., is present in a considerable number of cases of blackwater fever, and it is highly probable that, as BARRATT and YORKE, and DUDGEON, pointed out, the failure to recognize haemoglobinaemia may in many, if not all, cases be due to the fact that the attack was really over (*i.e.*, passage of haemoglobinuria had ceased) at the time the observation was made, even though the next specimen of urine voided contained haemoglobin. It is obvious that we require more precise information on this important question, and not merely vague statements that haemoglobinaemia was present or absent, but exact quantitative estimations, such as those made by BARRATT and YORKE, which should, so far as is possible, be correlated with records regarding the degree of haemoglobinuria excreted at the time the observation was made. For this purpose the use of a catheter will probably be necessary.

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* BARRATT and YORKE used wet human red cells as their standard, and when they state that serum, etc., contains a certain percentage of haemoglobin, they mean that there is in it as much haemoglobin as in a solution containing a similar percentage of normal human erythrocytes. Hence, in order to compare BARRATT and YORKE's figures with those of other observers who used normal human blood as their standard, it is necessary to multiply BARRATT and YORKE's figures by the fraction $\frac{5}{2}$, the erythrocytes constituting about 40 per cent. by volume of normal blood.

Although information on the point is, up to the present, not so complete as can be desired, there appears to be no justification for PLEHN'S assertion that haemoglobinaemia is, as a rule, not present in blackwater fever.

PLEHN'S statement that haemolysis occurs in the renal tubules as a result of admixture of blood from the capillaries with hypotonic urine requires very careful examination.

Leaving aside for the moment the precise nature of the renal lesions and their origin, and, admitting for the sake of argument that a certain amount of haemorrhage into the uriniferous tubules does take place, we must enquire whether the available facts justify PLEHN'S contention that it is here that the erythrocytes are haemolysed, owing to their contact with hypotonic urine. PLEHN apparently bases his hypothesis mainly on a belief that the specific gravity of the urine in blackwater fever is extraordinarily low (1,005–1,004 or even less), chiefly owing to its deficiency in NaCl and urea; although he also recognizes as a possible secondary cause the existence of haemolytic substances of the nature referred to by MATKO (1918).

BARRATT and YORKE (1909), who investigated the action of urine on erythrocytes very fully, write as follows :—

> "If an emulsion of red blood cells in 0·9 per cent. solution of sodium chloride is added to urine, it is seen that the latter, when the changes in the red cells described below become advanced, gradually turns brown in colour, but no reddish tint is noticeable. Urine does not produce visible laking of red blood cells unless its specific gravity is less than 1,009. Urine of specific gravity 1,002 lakes red blood cells as rapidly as distilled water. Red blood cells in urine whose specific gravity exceeds 1,009 become, on standing, poorer in haemoglobin and assume a darker, somewhat brownish, aspect, but are ultimately decolorized and form a brownish-white precipitate at the bottom of the tube in which the urine is contained. If such urine at any time after adding the red blood cells is centrifugalized and the supernatant fluid examined spectroscopically, it is found that no oxyhaemoglobin bands are at first seen, the red blood cells becoming decolorized without any laking of their haemoglobin. When, however, the red blood cells have lost 75 per cent. or more of their haemoglobin, oxyhaemoglobin bands make their appearance in the urine, which is now brownish in colour. Just as occurs when dissolved haemoglobin is added to urine, a precipitate brown in colour may make its appearance at the end of 24 hours in the mixture of urine and red cells. It is thus seen that in the red cell the haemoglobin is broken up by urine of specific gravity exceeding 1,009 *in situ*, and does not leave the cell until it has become completely converted into brown pigment."

The question now arises: Is PLEHN correct when he states that the urine in blackwater fever is of extraordinary low specific gravity?

On looking up the point in the various textbooks one finds nothing beyond the general statement that the specific gravity of the urine is rather low, *vide* ZIEMANN in MENSE's Handbuch, CASTELLANI and CHALMERS, etc. On searching through the literature, a few more or less isolated records are found. KRAUS (1904) gives details of a case in which determinations of the specific gravity were made in eight specimens of urine passed during the first two days of the illness; the figures varied between 1,034 and 1,016; determinations of five other specimens made during the third and fourth days gave results varying between 1,012 and 1,006.

CHRISTOPHERS and BENTLEY (1908) examined the specific gravity of the urine passed by one of their cases during the first three days of the illness and found that it varied between 1,017 and 1,020. CHRISTOPHERS and BENTLEY then add that if the urine were hypotonic, any haemorrhage into the urinary passages could give rise to a condition resembling haemoglobinuria—a theory apparently advanced by PELLERIN as long ago as 1865 and 1876. With a view to examining the question, CHRISTOPHERS and BENTLEY estimated the haemosozic value of the urine in a number of their cases and found that even when haemoglobinuria is present it is far above that at which red corpuscles are haemolysed, and consequently that the urine could not on account of its osmotic effect dissolve red cells.

BREM (1911) gives information regarding the specific gravity of the urine in one of his cases. Eight determinations were made during and after the attack over a period of four days; the readings obtained varied from 1,033 to 1,022.

DEADERICK (1910) states that the average of a large number of urine analyses gave a specific gravity of 1,015. PARSONS and FORBES (1919) give information regarding three mild cases of blackwater fever. The specific gravity of the urine in the first case varied from 1,023–1,015, in the second from 1,030–1,010, and in the third from 1,020–1,010.

By far the most complete records on the subject are, however, those of BARRATT and YORKE (1909), who examined the specific gravity of almost every specimen of urine passed by the cases which came under their observation. Critical examination of their records show that there is no justification for the statement that the specific gravity of blackwater urine is extraordinarily low, or, in fact, lower than normal. The specific gravity varied considerably in different specimens of urine from the same case; very few observations of 1,009 or less are recorded, and these low figures are in no way related to the presence in the urine of haemoglobin. This fact is particularly well illustrated by Case 10 of BARRATT and YORKE's series, in which the specific gravity was determined of almost every specimen of urine passed by the patient over a period of 14 days, during which time the patient had, in addition to the initial attack of haemoglobinuria, which lasted three days, 11 distinct relapses, between each of which the urine was of normal colour and appearance. The 85 determinations made on this case show that, although the specific gravity varied between 1,024 and 1,002, only six of the readings were below 1,010, and these low readings did not correspond to the haemoglobinuria attacks, but, on the contrary, were all made during the interval periods.

There appears then no justification for the general statement that the specific gravity of the urine in blackwater fever is abnormally low. It varies considerably, just as does that of the urine of normal persons, depending on a number of factors, one of the most important of which is the quantity of fluid ingested.

Another fact which tells against PLEHN's theory of the haemolytic action of the urine is that it is by no means uncommon to find unlaked erythrocytes in scanty numbers in the urine of blackwater cases. KRAUSS (1904) records that red cells were present generally in small numbers in seven, or possibly nine, of his 17 cases ; PARSONS and FORBES (1919) found them in two of their three cases, and DEADERICK in five of 34 cases. BARRATT and YORKE (1909) record that red blood cells were encountered during the haemoglobinuria of blackwater fever in 10 of the 20 attacks investigated, they were usually found in small numbers only ; in three cases red cells were not found at first, but as haemoglobinuria was passing off they made their appearance. DUDGEON (1920) writes that red cells which are present in relatively small numbers rapidly disappear from the urine in blackwater fever as the acute stages of the disease subside, but by accurate examinations of centrifuged samples of urine, red cells are found to occur more frequently in the acute stages of the disease than is generally believed and taught. ARKWRIGHT and LEPPER (1918) state that red blood corpuscles were usually absent from the urine, but a few were found in two of their cases.

Finally, as militating against PLEHN's theory that haemolysis takes place in the renal tubules, reference should be made to the fact that the amount of haemoglobin passed out in the urine in blackwater fever is very small compared with the destruction of blood which takes place. BARRATT and YORKE (1909) determined in 10 of their cases the total amount of haemoglobin passed into the urine and found that it varied between 1·5 gm. and 75 gm. of wet red cells ; when these amounts are considered with the haemocrit readings of the blood of the various cases, it will be seen that they represent a comparatively small fraction of the total loss of blood. ARKWRIGHT and LEPPER (1918) found that in one of their cases the total haemoglobin lost in the urine was equivalent to 11 oz. of normal blood, and remark that a loss of this order does not seem nearly sufficient to account for the high degree of anaemia produced by the disease.

This fact, while negativing PLEHN's theory, is quite in harmony with the theory that the haemoglobinuria is dependent on haemoglobinaemia, as it has been shown experimentally by YORKE and NAUSS (1911) that only one-fifth or less of the haemoglobin injected intravenously in rabbits is excreted by the kidneys. The following year a similar result was obtained by PEARCE, AUSTEN, and EISENBERG (1912), who found that after rapid injection into dogs of more than 0·012 gm. per kilo per minute of haemoglobin, 16 to 36 per cent. of the total amount, if this equals 0·25 gm. per kilo, is eliminated in the urine ; whereas if the injection of not more than 0·35 gm. per kilo is made slowly (less than 0·01 gm. per kilo per minute), the amount eliminated in the urine is only 2·33 to 9·5 per cent. of the total injected.

The facts available, therefore, do not support PLEHN's theory that the haemoglobinuria results from the laking of blood which escapes into the renal tubules ; the specific gravity of blackwater urine is not, as PLEHN asserts, abnormally low during an attack, unlaked red cells are frequently found in small numbers in blackwater urine, and, finally, the amount of haemoglobin found in the urine represents only a small fraction of the total haemolysis which occurs, as judged by the lowering of the haemocrit reading or red cell count.

Let us now consider PLEHN's hypothesis that, as a primary result of the blackwater toxaemia, or shock, the epithelial cells lining the renal tubules are profoundly affected, that they degenerate and become dislodged, and finally disintegrate, giving rise to the material from which the plugs are formed; and, furthermore, that the functional disturbances of the kidneys (oliguria, anuria, etc.) are the direct result of these changes in the epithelium.

This view is directly opposed to that expressed by WERNER (1907) and by BARRATT and YORKE (1909), and by many more recent authors, who found that the granular plugs are derived from haemoglobin, that there is no marked degeneration and disintegration of the epithelium, that dislodgment of the epithelium is a secondary matter, and that the functional disturbances are the result of mechanical obstruction of the tubules by the plugs.

In view of PLEHN's statements, the subject has quite recently been reinvestigated by SALVIOLI (1922), who, as the result of microscopic examination of the kidneys of 13 cases of blackwater fever, in the course of which he employed, in addition to the ordinary methods, that devised by MILLER (1911) for elective staining of haemoglobin, finds himself unable to confirm PLEHN's observations. Pronounced degenerative changes in the epithelial cells were observed in only two cases, and in those the excretion of haemoglobin was insignificant. The epithelial cells in the proximal portion of the uriniferous tubules were unchanged in 11 cases, the loss of epithelium was mechanical, due to friction of the plugs, and the dislodged cells were normal. Blood was found only in the blood-vessels and the corpuscles were normal; traces of blood destruction were not found. The most important finding was the filling of the tubules with granular, or flocculent, masses and widening of the lumen, and here and there in the distal portion of the tubules, dislodgment of the epithelial cells and thick coagulation masses. The majority of the preparations showed that the masses found in the distal part of the tubules originated either out of haemoglobin-impregnated substances or out of coagulation masses mixed with drops of pure haemoglobin.

The experimental work recorded by the reviewer in 1911(*a*) affords strong support to the view that the epithelial changes in the kidneys of blackwater fever patients are secondary to the passage through them of haemoglobin and not, as PLEHN considers, precursors of the haemoglobinuria. By introducing into the circulation isotonic solutions of haemoglobin prepared from the animals' own erythrocytes, the reviewer succeeded in producing in rabbits renal changes identical with those found by WERNER, and by BARRATT and YORKE, in the kidneys of blackwater fever patients, and, furthermore, suppression of urine and death from uraemia. He summarized this observation as follows:—

> "The immediate result of such injections is a diuresis, dependent upon the action of the sodium chloride solution used for dissolving the haemoglobin. At the same time the renal epithelium commences to excrete haemoglobin into the tubules. At first this is quickly carried away by the rapid secretion of watery urine from the glomeruli. The result is a considerable flow of clear urine containing haemoglobin in solution. As the diuresis subsides, the haemoglobin, or a closely related derivative, becomes deposited to a certain extent in the tubules. At this stage the urine is less in amount and contains a quantity of solid material, consisting chiefly of granular casts and débris. Still later, especially when the degree of haemoglobinaemia is high, epithelial cells are shed from the lining membrane of the renal tubules. This is probably dependent upon one or both of the following factors. In the first place it is possible that the excretion of large quantities of a foreign substance like haemoglobin may

be attended by injurious effects upon the renal epithelium. In the second place the presence of casts in the lumen of the tubules would tend to damage the lining epithelium mechanically, either by friction as the plug was forced down the tubules owing to the *vis a tergo* of the glomerular secretion, or by causing a complete or partial block of the tubule, and, as a result, dilatation of that portion above the plug, and, consequently, separation of the epithelium from the basement membrane.

" This stage represents the commencement of the development of suppression of urine. Gradually, as haemoglobin continues to be excreted by the renal epithelium more and more tubules become occluded. The situation in which complete blocking of the lumen first occurs appears to be, as a rule, the narrow tubules of Henle. Coincidently, with the plugging of the tubules there is a marked diminution in the amount of urine voided, and also of the haemoglobin it contains. The condition steadily progresses, until, finally, complete anuria results. After cessation of the flow of urine has lasted for a certain time, a gradual re-establishment of urinary secretion occurs. The urine is loaded with albumen, and is exceedingly turbid. On centrifugalization a large deposit, sometimes equalling as much as one-fourth of the volume of urine, is thrown down. This deposit consists of granular casts, epithelial casts, granular débris and degenerated epithelial cells. Urine of this nature continues to be passed until the animal's death. During the period of total or partial anuria marked changes occur in the kidney. Owing to the secretion of the glomeruli those portions of the tubules above the plugs become enormously distended with fluid. As a result, the epithelium lining these portions becomes extremely thin, and in places entirely disappears. The dilated tubules press upon adjacent tubules, so that on microscopic examination the latter appear of small size, and their lumina are completely obliterated.

" After a time, owing to gradual disintegration of the casts plugging the tubes, the urine commences to escape into the ureter once more.

" The serum proteins and red blood cells pass through the damaged epithelium and those portions of the tubules devoid of epithelial cells, with the result that the urine is loaded with albumen. Although the casts may be to a great extent washed away in the course of the next few days, yet the renal tubules remain dilated and the serum proteins continue to escape into the urine until the animal's death, which in these cases is probably due to uraemia."

In a later paper (1911(*b*)) the reviewer showed that haemoglobin is secreted by the epithelial cells lining the tubules and not by Bowman's capsules.

If the red-water of dogs infected with *P. canis* be examined, it will be found to contain in considerable quantity the finely granular casts and detritus so characteristic of blackwater fever urine. A similar observation has been made repeatedly by the reviewer in the urine of patients suffering from paroxysmal haemoglobinuria. Now, in both these conditions haemoglobinaemia is a well-marked phenomenon, and there is no reason to doubt that it precedes and is the cause of the haemoglobinuria. As a result of examination of the kidneys of dogs infected with *P. canis*, the reviewer (1911) concluded that granular material was derived from the haemoglobin excreted through the epithelium of the renal tubules.

From this discussion it will be seen that the bulk of pathological and experimental evidence is overwhelmingly against Plehn's theory of a primary renal lesion with haemoglobinuria as a secondary phenomenon. Profound degeneration of the renal epithelial cells is not found and the granular detritus and casts seen in the urine and renal tubules are not derived from disintegrated epithelial cells. Dislodgment of the epithelial cells, and such degeneration as does occur is a secondary matter and probably due, in part at least, to mechanical causes. The serum proteins and red cells which are found in the urine in severe cases of blackwater gain access to the tubules through the lesions produced by dislodgment of the epithelium.

In conclusion, it must be pointed out that although it is clear that a sudden, and often enormous, haemolysis occurs in blackwater fever, nothing is known regarding the mechanism by which it is produced or where it takes place. In paroxysmal haemoglobinuria the work of DONATH and LANDSTEINER (1904), WIDAL and ROSTAINE (1905), EASON (1906) and others has shown that haemolysis takes place in the peripheral blood and that cold is the exciting cause. The precise mechanism of autolysis in this condition has recently been studied in great detail by YORKE and MACFIE (1921), and a simple method of determining the existence of the autolysin described. No autolysin has, however, been found in the blood of blackwater fever patients (BARRATT and YORKE, and others). DUDGEON (1920) records that he has succeeded in demonstrating a haemolytic action of acetone and alcohol extracts of the spleen, kidneys and urine of patients who have died of blackwater, and that this substance was not found in the urine and organs of persons who had died of other diseases; and NIERENSTEIN (1919) states that he has found in the urine of blackwater patients a derivative of quinine—haemoquinic acid—which exerts a powerful haemolytic action. These observations, however, require confirmation, and in any case their bearing on the haemolysis which occurs in blackwater fever is far from clear.

Very many observations have been made by different authors to determine whether in blackwater fever there is any abnormal sensitiveness of the erythrocytes to hypotonic saline, quinine, etc. The general consensus of opinion is undoubtedly that there is none. CHRISTOPHERS and IYENGAR (1915) conducted a long series of experiments on the effect of haemolytic drugs, toxins and antisera upon the haemolytic point and the association between this point and haemoglobinuria. They found in their experiments, which were conducted upon rabbits, that potassium chlorate, carbolic acid, sodium glycocholate, sodium taurocholate, quinine, diphtheria toxin and pyocyaneous toxin neither induced haemoglobinuria nor had any effect on the haemolytic point; those substances, however, which caused haemoglobinuria (pyrogallic acid, abrin and haemolytic serum) raised the haemolytic point, but none of these ever produced haemoglobinuria until its action had resulted in a raising of the haemolytic point to 0·9. CHRISTOPHERS and IYENGAR conclude from this that if in blackwater fever, as is generally agreed, there is no distinct raising of the haemolytic point, this may be taken as indicating that the mechanism of haemoglobinuria in this disease is fundamentally different to that occurring in the haemoglobinuria induced by the injection of a toxic substance or of an artificial haemolysin.

The mechanism by which jaundice, which is usually so prominent a symptom in blackwater fever, is produced, is as yet unsolved. In this disease there is abundant evidence of a great production of bile, *e.g.*, the frequent vomiting of large quantities of material heavily charged with bile, the presence of bile pigment in the serum, and the post-mortem findings of a gall bladder loaded with dark green sometimes almost black, inspissated bile. It is important to no that although bile-pigment is usually found in the serum it has o occasionally been discovered in the urine. BARRATT and Yo

(1914) showed experimentally that the introduction of isotonic haemoglobin solutions into the circulation of rabbits resulted not only in a considerable increase in the volume of bile poured into the gall bladder, but also in the concentration of bile-pigment. No jaundice, however, was obtained by this means, nor has any been noted by the reviewer in cases of paroxysmal haemoglobinuria. It appears, therefore, that the mere existence of haemoglobinaemia, even in a degree far exceeding that which has hitherto been recorded in blackwater fever, is of itself insufficient to produce icterus, and that consequently in blackwater fever there must operate some additional factor about which at present nothing is known. Reference should, however, here be made to the very interesting series of papers by Pearce, Austen, Krumbhaar, and others (1912), who showed that under certain conditions jaundice resulted from the intravenous injections into dogs of haemolytic serum and even after injections of haemoglobin.

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HELMINTHIASIS.

KHALIL (M.). **An Early Contribution to Medical Helminthology translated from the Writings of the Arabian Physician, Ibn Sina (Avicenna) with a Short Biography.**—*Jl. Trop. Med. & Hyg.* 1922. Mar. 15. Vol. 25. No. 6. pp. 65–67.

A literal translation is given of the chapter on worms in the " Laws of Medicine," an Arabic manuscript in the Oriental Library of the British Museum. The author points out that in this manuscript Avicenna, in A.D. 1131, clearly recognized *Ascaris lumbricoides*, *Taenia* (*saginata*), *Oxyuris vermicularis* and *Ancylostoma duodenale*. Felix mas was advocated for Taenia and hookworm and common salt enemata for Oxyuris. The habitat of the various worms is also clearly defined.

R. T. Leiper.

YOKOYAMA (Toshihisa) & NIWA (Tsuruo). [**A Comparative Study of the Various Methods of Examination of the Eggs of the Intestinal Parasites.**]—*Nihon Shokakibyo Gakkwai Zasshi* (*Japan Jl. of Gastro-Enterology*). 1922. Jan. Vol. 21. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 116.]

The author finds from a comparison of different processes that the combined method of floating and sedimentation is the best in general practice for the examination of the eggs of intestinal parasites.

R. T. L.

CAMERON (Thomas W. M.). **The Dog as a Carrier of Disease to Man.**—*Lancet.* 1922. Mar. 18. pp. 564–565.

The paper gives a valuable summary of the various helminth infestations of the dog and discusses their bearing on human disease. The author notes the presence of a second species of the double-pored tapeworm, *Dipylidium sexcoronatum*, and suggests the probability of its occurrence as a parasite of man. In spite of his historical rôle of hunter, protector and friend of man, the dog should be " treated as a dog and not as a human being."

R. T. L.

FAIRLEY (N. Hamilton). **Observations and Reflections on the Toxicity, the Immunity Response, and the Treatment of Certain Helminthic Infestations.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st-28th August, 1920.* pp. 227–239. (Discussion, p. 239.)

This paper reviews recent work and is largely devoted to a repetition of the author's published results [see this *Bulletin*, Vol. 19, p. 199].

R. T. L.

SMITH (Sidney). **Clinical Notes on a Case of Sporadic Non-Imported** *Bilharzia haematobia* **contracted in Bolarum, Hyderabad (Deccan).** —*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 300–302.

The terminal-spined eggs of *S. haematobium* were found microscopically in the faeces of a British soldier stationed at Secunderabad.

A few eggs were subsequently found in the urine, and it appeared on enquiry later that the specimen of faeces first examined contained also urine. There were no clinical signs of schistosomiasis. The patient had gone straight to India with his unit 14 months previously, and before that had never left England. A year previous to the recognition of the infection the patient had been in the habit of taking lonely walks to one or other of two small tanks in the vicinity of Bolarum a few miles from the city of Secunderabad and of bathing in them. An irritating rash of the thighs and abdomen appeared a few days afterwards. He suffered frequently from attacks of vomiting. The author proposes to publish a note later on the molluscan fauna of the tanks from which the infection was acquired.

R. T. L.

HARKNESS (A. H.). *Bilharzia haematobia* **in India.**—*Brit. Med. Jl.* 1922. Mar. 25. pp. 475–476.

A few live ova of *S. haematobium* were found in the urine of a patient examined at the venereal diseases department of St. Peter's Hospital, London. The patient was presumably infected in India, where he had resided for four years.

R. T. L.

HARRISON (P. W.). **Bilharzia in Mesopotamia.**—*Indian Med. Gaz.* 1921. Dec. Vol. 56. No. 12. pp. 449–450.

Beni Terrif, a town of about 15,000 inhabitants, is a nest of bilharzia infection. Out of 500 patients treated for general complaints during a stay of one week, the author found one in six to have obvious bilharziasis. Of 30 specimens of urine examined microscopically, 15 showed typical bilharzia eggs. The real incidence of the disease is much greater.

R. T. L.

CAWSTON (F. G.). **Bilharzia Disease in South Africa.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 975.

The author records the identification of the cercaria of *S. haematobium* in *Physopsis africana* collected from Baaken's Spruit at Port Elizabeth, Cape Province.

R. T. L.

WOOD (John Y.). **Report on Bo School for Sons of Chiefs during 1920—January to July.**—*Sierra Leone Annual Med. & San. Rep. for the Year ending 31st December, 1920.* pp. 47–50.

Forty-six out of 150 boys (*i.e.*, 30·6 per cent.) showed bilharzia eggs in the urine. Practically none reported sick for the condition during the nine months in which the author was in charge. Nearly all the tribes represented are infected, for the infection is found almost immediately after admission.

R. T. L.

BORGES (I.). **Un cas autochtone de Bilharziose en Portugal.**—Reprinted from *Bull. Soc. Portugaise des Sci. Naturelles.* 1921. July 15. Vol. 9. 1 p. With 1 text fig.

The author reports the occurrence of a case of *S. haematobium* acquired in St. Luzia, near to Tavira, in Portugal. The patient had suffered for a long time from haemorrhagic cystitis, and in the urine

Dr. B. Lopes had found a parasite, which the author identified as a miracidium of *S. haematobium*. This is the first case recorded as indigenous in Portugal. The note is illustrated with a beautiful microphoto of the *S. haematobium* egg.

R. T. L.

França (Carlos). **A Preliminary Note on Bilharziosis Indigenous in Portugal.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Nov. 17 & Dec. 15. Vol. 15. Nos. 5 & 6. pp. 180–181.

The Ibero-Algerian *Planorbis corneus* var. *metidjensis* exercises a very definite chemotaxis for the miracidia of *S. haematobium*. *P. corneus* and *Physa acuta* are the only molluscs hitherto found in the pond at Tavira, where endemic cases of *S. haematobium* have been recently discovered. In experimental infections the great majority of *P. corneus* die within a short time of being attacked, and in such dead specimens well-developed sporocysts are found. This pronounced pathogenic action of *S. haematobium* upon *P. corneus* is held by the author to explain the slow spread of bilharziasis in Portugal. Fortunately there the endemic area is a small one.

R. T. L.

Kazama (Yoshiaki). **[On Pathological Anatomical Findings of the Rabbit infested with** *Schistosomum japonicum*, **especially on the Pathological Changes in the Liver and Kidneys.]**—*Hokuetsu Igakkwai Zasshi* (*Jl. of Hokuetsu Med. Soc.*). 1921. Oct. Vol. 36. No. 5. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. pp. 85–86.]

The pathological changes following upon the experimental infection of rabbits with *S. japonicum* are ascribed chiefly " to the living phenomena of the worm itself." In the liver sclerosis occurs; in the spleen oedema, proliferation of the stroma and fibroadenia; in the kidneys an atrophic change develops, which is called by the author schistosomic nephritis. In the lungs where the worms lie wedged in the pulmonary arteries there develop proliferation of the interstitial tissues and of the epithelioid cells, either of the alveoli or bronchi. In a severe infection one may meet with atrophy of the thyroid, disturbed secretion of colloid matter, fibroadenoid degeneration of lymphatic glands, also proliferation of the intima and emboli. These changes are attributable to the toxic substances secreted by the worm.

R. T. L.

Kazama (Yoshiaki). **[On Enteric Carcinoma in Schistosomiasis japonica, together with a Causative Relation between the Development and the Parasite's Egg.]**—*Gann.* (*Japan. Jl. Cancer Res.*). 1921. Aug. Vol. 15. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 22.]

From a study of nine cases of intestinal carcinoma, which were clearly caused by *S. japonicum*, the author considers that " the carcinomatous change is attribut[able] partly to the heterotropic glandular epithelial cells caused by the presence of the parasite's eggs and to the adenomatous change caused by the infiltration of the eggs." In some cases, however, a remarkable infiltration of the eggs in the boundary line of the normal and the carcinomatous tissues may prove that the carcinoma has developed from the intestinal glandular epithelial cell. The rôle of the eggs may be partly mechanical and partly toxic.

R. T. L.

CAWSTON (F. G.). **The Emetine Treatment for Bilharzia Disease.**—*Jl. Trop. Med. & Hyg.* 1922. May 1. Vol. 25. No. 9. pp. 112–113.

From experiences with over 300 injections of emetine hydrochloride the author believes that this method of treating bilharzia infections "is free from undesirable toxic effect, and is permanently successful in eradicating the infection." The depressing effects due to the large doses required by adults render it a method which should be confined to children and young persons.

R. T. L.

KHALIL (M.). **On the Susceptibility of the Egg Masses of Planorbis to Drying, Chemical Fertilizers, etc., and its Bearing on the Control of Bilharzia Disease.**—*Jl. Trop. Med. & Hyg.* 1922. Mar. 15. Vol. 25. No. 6. pp. 67–69.

Working with *Planorbis corneus* it has been ascertained that the egg masses are very susceptible to drying, and the embryo, at whatever stage of development it may be, dies after five hours' exposure. Ammonium sulphate fertilizer, recommended by LEIPER on account of its lethal action on the adult snails, was found to be lethal to the egg masses in a dilution of 1 in 5,000 during any period of more than 20 hours.

R. T. L.

JONES (S. B.). **Some Notes on Intestinal Bilharziasis in the West Indies.**—*Jl. Trop. Med. & Hyg.* 1922. Feb. 1. Vol. 25. No. 3. pp. 25–27. With 4 figs.

Three cases of *S. mansoni* infection are recorded from Boyd's village, not far from Basseterre, the capital of St. Kitts, and about 24 cases from the village of Colombier, French St. Martin. No cases were found in Anguilla. MANSON's original case with lateral-spined bilharzia eggs in the faeces was reported from Antigua. There is considerable communication between Anguilla and St. Kitts and St. Martin, and the author considers that the disease is a menace to the health of the whole of the West Indian population.

R. T. L.

BETTENCOURT (A.) & BORGES (I.). **Réaction de fixation dans la bilharziose vésicale avec antigène de** *Fasciola hepatica.*—*C.R. Soc. Biol.* 1922. May 13. Vol. 86. No. 17. pp. 1053–1054.

The results obtained by HOPPLI when employing alcoholic extracts of *F. hepatica* adults from sheep's liver in the diagnosis of *Schistosoma mansoni* have not been confirmed by these authors for known cases of *Schistosoma haematobium* in Tavira. They obtained 17 negatives and 6 positives; and found also that their alcoholic extract was an efficient Wassermann antigen giving results entirely parallel with that of the ox heart antigen.

R. T. L.

HÖPPLI. **Die Diagnose pathogener Trematoden durch Blutuntersuchung.** [Diagnosis of Pathogenic Trematodes by Blood Tests.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 365–366.

Alcoholic extracts of the livers of sheep infected with *Fasciola hepatica* gave complete fixation of complement with sera of patients infected with *Schistosoma mansoni.* This antigen may therefore prove of practical utility where the livers of infected snails are not available for FAIRLEY's test. This antigen gives, however, a positive reaction with syphilitic sera. Many full grown oxen in which no lesions were found reacted positively, while young animals usually reacted negatively. [No experimental data are given.]

R. T. L.

KOBAYASHI (Harujiro). [**On the Special Condition which is needed for the Development of the Endoparasitic Trematodes, in Special Reference to the Reason why Pulmonary Distomiasis is present endemically.**]—*Chosen Igakkwai Sasshi* (*Jl. of Korean Med. Soc.*). 1921. Dec. No. 36. [Summarized in *Japan Med. World.* Tokyo. 1922. May 15. Vol. 2. No. 5. p. 139.]

It is essential for the prevalence of lung fluke disease that in one and the same district there should prevail (*a*) the first intermediary; (*b*) the second intermediary; (*c*) the custom of eating crabs in the raw state by the inhabitants.

R. T. L.

ONORATO (Raffaele). **La paragonimiasi in Tripolitania.**—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1920. Jan. Vol. 1. No. 1. pp. 1–13. With 1 text fig.

The case of paragonimiasis here recorded is the first case reported in Tripoli. On account of haemoptysis the case was at first mistaken for one of pulmonary tuberculosis. Some signs were noted in the lungs, especially in the left apex. A marked secondary anaemia was found. The sputum examination showed blood and pus corpuscles and some ovoid bodies 85–97μ by 45–56μ, yellowish brown in colour. When cleared with a drop of glycerine each egg was seen to have a thin polished wall with a double contour, enclosing a number of small granular cells with one larger cell at one of the poles. By exclusion of other possibilities the egg was recognized as that of *Paragonimus westermanni.* The patient was treated with inhalations (balsamic) and tonic injections. He died shortly after an attack of haemoptysis, but an autopsy was not possible. Up to the present Professor Onorato has been unable to find the larvae of this distome in any of the fresh water animals in Tripoli.

J. Rosslyn Earp.

RYUJI (Setsuzo). **[Diagnostical Value of Complement Fixation in Distomiasis.]**—*Okayama Igakkwai Sasshi* (*Jl. Okayama Med. Soc.*). 1922. Jan. No. 384.

Alcoholic extracts of the moist livers of rabbits infected with *Clonorchis sinensis* gave the following results in complement tests :—

Positive. 10 experimentally infected rabbits.
3 do. do. dogs.
60 per cent. of cases of moderately or heavily infected human beings.
Negative. 12 normal rabbits.
3 do. dogs.
11 do. human beings, infected patients showing no symptoms.

No pseudo-positive reactions were obtained with cases of infection with :—ascarids,• ankylostomes, Trichocephalus, or *Treponema pallidum* ; also catarrhal jaundice not due to Clonorchis and cancer of the liver did not cause the serum to react positively. The technique is complicated and it is concluded that the examination of the faeces is an easier and always reliable method.

R. T. L.

LÉON (N.) & CIUREA (I.). **Un nouvel echinostome chez l'homme.**—*C.R. Soc. Biol.* 1922. June 24. Vol. 87. No. 23. pp. 262–264. With 1 text fig.

In the stools of a Roumanian peasant Léon found at Jassy, in 1916, a trematode which at first was identified as *Echinostoma ilocanum* (*Annales scientifiques de l'Université de Jassy*, 1920, Vol. 10, Nos. 3 & 4). Further examination proves that the worm belongs to a new species of Euparyphium named *E. jassyense.* This species differs from others in the same genus, especially in the location of the testes in the anterior part of the body and in the size of the eggs, which measure 0·132–0·154 mm. by 0·079–0·085 mm. A good figure illustrates the text.

R. T. L.

HERNAULT (J.). **Le Fasciolopsis Fulleborni.**—*Bull. Méd. Franco-Chinois.* Pekin. 1920. July–Oct. Vol. 1. No. 1. p. 38. With 1 plate.

A case of infection with *Fasciolopsis fulleborni* is briefly recorded. The patient was a medical student, age 26, from Haohing, who had suffered for several years from chronic fever and intractable diarrhoea. The note is chiefly of interest on account of the text figure by Professor BRUMPT illustrating the large cirrus-pouch which is presumed to be a characteristic of this species.

R. T. L.

EDWARDS (F. W.). **The Carriers of** *Filaria bancrofti.*—*Jl. Trop. Med. & Hyg.* 1922. June 15. Vol. 25. No. 12. pp. 168–170. With 1 text fig.

To the special Manson number of the *Journal of Tropical Medicine and Hygiene* the writer contributes a useful list of the mosquitoes which have been implicated as efficient or partially efficient intermediaries for the *Filaria bancrofti.* Seven species are noticed as

intermediaries in which complete development has been observed, viz.: (1) *Culex fatigans*; (2) *Aëdes* (*Stegomyia*) *variegatus* (syn. *Culex scutellaris* (Walker nec Theobald), *Stegomyia pseudoscutellaris*); (3) *Aëdes* (*Finlaya*) *togoi*; (4) *Taeniorhynchus* (*Mansonioides*) *africanus*; (5) *Anopheles* (*Myzomyia*) *rossi*; (6) *Anopheles* (*Myzomyia*) *costalis*; (7) *Anopheles* (*Anopheles*) *algeriensis*. Twenty-three species are listed as forms in which partial development only has been observed, viz.: (1) *Aëdes argenteus* (*Stegomyia fasciata*); (2) *Culex sitiens* (*C. jepsoni*, *C. micro-annulatus*); (3) *C. bitaeniorhynchus*; (4) *C. gelidus*; (5) *Aëdes* (*Stegomyia*) *albopictus* (*Culex albopictus*, *Stegomyia scutellaris*); (6) *A.* (*S.*) *galloisi*; (7) *A.* (*S.*) *chemulpoensis*; (8) *A.* (*S.*) *argenteus* (*Stegomyia fasciata*); (9) *A.* (*S.*) *perplexa*; (10) *A.* (*S.*) *desmotes* (*S. gracilis*); (11) *A.* (*S.*) *albolineatus*; (12) *A.* (*Ochlerotatus*) *caspius* (*Culex penicillaris*); (13) *Taeniorhynchus* (*Taeniorhynchus*) *pseudotitillans*; (14) *T.* (*Mansonioides*) *annulipes*; (15) *Anopheles* (*Anopheles*) *maculipennis*; (16) *A.* (*A.*) *bifurcatus*; (17) *A.* (*A.*) *hyrcanus* (*sinensis*); (18) *A.* (*A.*) *hyrcanus* var. *vanus Myzorhynchus nigerrimus*, *M. minutus*, *A. pseudopictus*); (19) *A.* (*A.*) *hyrcanus* var. *peditaeniatus*; (20) *A.* (*A.*) *barbirostris*; (21) *A.* (*Myzomyia*) *annulipes*; (22) *A.* (*Nyssorhynchus*) *albimanus* (*albipes*); (23) *A.* (*N.*) *argyrotarsis*.

Twelve species are given as having been tested for filarial infection by various workers with negative results, viz.: (1) *Armigeres* (*Armigeres*) *obturbans* (Walker); (2) *A.* (*A.*) *jugraensis* (Leicester); (3) *A.* (*A.*) (*Leicesteria*) *flava* (Leicester); (4) *A.* (*L.*) *dolichocephala* (Leicester); (5) *A.* (*L.*) *annulitarsis* (Leicester); (6) *Heizmannia metallica* (Leicester); (7) *Aëdes* (*Finlaya*) *notoscriptus* (Skuse); (8) *A.* (*Skusea*?) *amerii* (Ludlow) (syn. *Stegomyia fusca*, Leic.); (9) *A.* (*Ochlerotatus*) *vigilax* (Skuse) (? also recorded as *C. nigrithorax* and *C. procax*); (10) *A.* (*Aëdes*) *butleri* (Theobald); (11) *A.* (*A.*) *eroensis* (Yamada); (12) *A.* (*Myzomyia*) *funestus* (Giles).

In addition, three forms are given here which also appear in the list of those in which a partial development has been observed.

R. T. L.

BLACKLOCK (B.). **The Signs of Filarial Disease.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 107–117. With 1 text fig.

The signs of filarial disease are so varied in character and so diverse in their relationship to the presence of microfilariae that it is well to adopt some such standard as that of STEPHENS for tabulating results. The author has so arranged his statistical studies of 240 natives of Sierra Leone with a view to establishing a correlation between "signs of filarial disease" and the occurrence of *Microfilaria bancrofti* in the blood. The figures obtained do not show the same kind of correlation as do the figures obtained by STEPHENS in his analysis of MANSON-BAHR's Fijian cases. The figures in the present series actually show that there is no more correlation with the presence of microfilaria than with hernia. The author considers that "signs of filarial disease" is a term which requires a further and critical examination and modification. To diagnose filarial disease from the discovery of enlarged glands, hydrocele, and so on, may be as misleading as to diagnose malaria simply from enlargement of the spleen.

R. T. L.

FLU (P. C.). [In Dutch & English.] **Beschouwingen naar aanleiding van een onderzoek over de verbreiding van** *Filaria bancrofti* **onder de inlandsche bevolking van Weltevreden. Some Notes on an Inquiry on the Spread of** *Filaria bancrofti* **among the Native Inhabitants of Weltevreden.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 3. pp. 330–363.

Although the conditions for the spread of filaria in Batavia are favourable the degree of infection appears to be slight. Of 1,112 male natives of Weltevreden examined between 9 and 11 p.m., 95, *i.e.*, 8·5 per cent., were found to have microfilariae. The figures vary for various districts from 2·3 per cent. to 15 per cent. The filaria of Batavia is *F. bancrofti* and shows nocturnal periodicity. The most suitable carriers proved to be *Culex fatigans* and *Stegomyia scutellaris.* The following mosquitoes were also experimentally infected: *Myzomyia* (*Anopheles*) *ludlowi* and *M.* (*A.*) *rossii.* In the Anopheles large numbers of the larvae perished. The climate and temperature of Batavia are very suitable for the spread of the parasite. The mean temperature is 27° C. The coast climate is not only warm but also damp, thus affording favourable conditions for the invasion of the definitive host. Another important factor is the fixed location of the population. Persons from a region free of filaria who live in a country strongly infected with the parasite do not become infected for years. In Weltevreden there is a large moving population, and the author considers that these act as "traps," absorbing a large proportion of the larvae from the infected mosquitoes, thus reducing the chances of infection in the local residents.

R. T. L.

SUGANUMA (Seijiro). **Contributions to the Knowledge on the Periodicity of the** *Filaria bancrofti.*—*Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. pp. 1–4.

Repeated use of Low's standard 20 cmm. of blood for the counting of microfilaria having shown that the method is quite undependable, the author adopted the acetic acid concentration method of SMITH and RIVAS and found that periodicity of the microfilariae had no absolute significance, though a distinct relative one. Further, the microfilariae showed no marked difference in numbers in capillary and venous blood taken at the same time. By using an apparatus in which a tube containing blood with microfilariae was connected by a capillary to a tube containing blood free from microfilariae but containing chemotropic substances, the author ascertained that the microfilariae showed "strong positive chemotropism against carbon dioxide, urea, uric acid and grape sugar, but quite negative chemotropism against ammonia." Investigations upon the periodical fluctuation of non-protein nitrogen, of gas content, and of sugar content, and of their relation to the microfilarial periodicity led the author to conclude that this periodicity and food intake have no intimate relation, that the regular fluctuation of blood-gas is surely connected with the microfilarial periodicity, but that there are other still more important factors, among which a strong negative heliotropism is the most striking.

R. T. L.

McFarland (William L.). **Observations on the Microfilaria of** *Filaria bancrofti*.—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 187–194.

During 1918 the staff of the Board of Health Laboratory in the Panama Canal Zone examined several hundred thick blood smears for malarial parasites. The opportunity was taken to make simultaneously a filarial survey. The blood of 1,124 individuals was examined. In 504 brush cutters the smears were taken between 3 a.m. and 7 a.m. Twelve were positive. Of 556 smears taken from ward patients in the Ancon and St. Tomas hospitals between 7 and 8 a.m. and 7 and 8 p.m., 21 were positive. Not one of the 34 positives was under observation or treatment for any condition attributable to filariasis. [The population in Panama is constantly shifting, and of foreign nationalities, and little importance can be attached to the results recorded here.]

R. T. L.

Suganuma (Seijiro). [**On the Count of Microfilaria.**]—*Chugai Iji Shimpo* (*Internat. Med. News*). 1921. Aug. No. 994. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 24.]

A new method for the counting of microfilaria is to stir thoroughly 1 cc. of blood with 100 cc. of a 3·5 per cent. solution of acetic acid and 10 cc. of acetic acid saturated with fuchsin. The mixture should be centrifuged and the supernatant fluid removed by means of a pipette. The residue is washed once or twice with water and again centrifuged. The sediment is examined microscopically and the count made by means of ruled glass.

R. T. L.

Connal (A.) & Connal (S. L. M.). **The Development of** *Loa loa* **(Guyot) in** *Chrysops silacea* **(Austen) and in** *Chrysops dimidiata* **(Van der Wulp).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 64–89. With 28 figs.

This important communication amplifies a preliminary note published in 1921 (see this *Bulletin,* Vol. 19, p. 225). The experiments made with Chrysops at Sapele between May and July, and at Calabar in December, have enabled the authors to describe and figure the whole development of *Filaria* (*Loa*) *loa.* These experiments were carried out with wild flies, as the development of the local species of Chrysops is unknown and the hopes of rearing clean flies from larvae or pupae did not materialize. The percentage of naturally infected flies during June and July proved to be 3·5 per cent. as a result of a dissection of 225 wild flies. Moreover, it was possible to recognize even a small feed of blood through the abdominal chitin for at least two days, so that with a two days' detention it was easy to detect any natural infection in view of the rapid growth and morphological changes which take place in the worms. The developmental changes undergone by the embryos of *L. loa* in Chrysops resemble those described for *F. bancrofti.* Certain differences occur, chiefly in the site of development, the attitude of the developing forms, their retention of the power of movement, and the size of the mature larva.

Ten days is the usual period required for the completion of the life-cycle in the insect host. The appearances seen from day to day are described and illustrated. During the third day the gut becomes complete. The body is now more of a torpedo shape, and, *in situ*, it has a double coil. The length is from 280 to 300μ. On the fourth day the short stumpy shape is lost. Throughout the fifth day the length increases, reaching 0·8 to 1 mm. On the sixth day the corkscrew appearance is replaced by gentle curves and the worm peels. The sharp-pointed tail is replaced by a rounded and trilobed caudal end. The worm continues to increase in length, and on the tenth day measures 2 mm. long and 25μ broad The earlier stages of development take place in the muscular and connective tissue, principally in the abdomen of the flies, but also in the thorax and the head. Migration takes place from the seventh day, and by the tenth day the larvae are congregated in the head, mainly at the root of the proboscis. Evidence was procured that flies can remain infective for from five to six days.

R. T. L.

CHARLES (E.). **Removal of Filaria from under the Conjunctiva.**—*Brit. Jl. Ophthalm.* 1922. July. Vol. 6. No. 7. pp. 321–322.

A resident of Sialkot district, near Jammu State Territory, developed a swelling on the inner and downward side of his eyeball beneath the ocular conjunctiva. The vision was not affected, but there was redness, watering, the pupil was dilated and the patient suffered great pain. A female worm measuring 33 mm. in length by 2 mm. in width was removed, but was much contracted and shrunken when it was examined later by Major SEWELL. The cuticle was transversely striated. In all probability the worm was an example of *Filaria conjunctivae* Addario.

R. T. L.

GRIFI (Vincenzo). **Manifestazioni nervose da elmintiasi.** [Nervous Manifestations of Helminthiasis.]—*Policlinico.* Sez. Prat. 1922. Feb. 27. Vol. 29. No. 9. pp. 292–293.

Nervous affections, often of a most varied and indefinite nature, have for a long time been attributed to the presence of intestinal parasites in children ; such symptoms, for example, as tonic or clonic spasms, epileptiform convulsions, hysteria, psychical disturbances, and so forth. In view of the gravity of the symptoms manifested in the following case the author considered it worthy of being placed on record.

A boy, eleven years of age, previously healthy, was suddenly seized with vertigo, weakness of the legs and a staggering gait, and fell to the ground. He was unable to rise, but exhibited no convulsions or loss of consciousness, no fever, vomiting or sphincter involvement. When brought to the hospital [how long after the onset is not stated] he had a marked spastic gait, the toes scraping along the ground and the knees somewhat rigid ; Romberg's sign was not present and there was no affection of the cranial nerves. There was increased muscular tonus with brisk reflexes in the upper limbs, marked increase of deep reflexes in the lower, with a positive (extensor) Babinski response. Speech was slurring. In getting down from the couch he suddenly fell backwards with body and legs rigid, and sustained a lacerated and contused wound of the head. Medical men present thought the child was suffering from tetanus, but no symptoms of this condition were confirmed. As a history was volunteered of the passage of ascarides some days previously, santonin was prescribed. As a result he passed several more ascarides and all the symptoms cleared up, the reflexes became normal, and the gait no longer spastic.

The author is of opinion that a toxin produced by the ascaris may act either directly upon the pyramidal tracts after being absorbed from the intestine, or indirectly by effecting changes in the endocrine glands and so bringing about tetanus-like symptoms.

H. Harold Scott.

MOORE (Allen H.). **Intestinal Parasites as a Frequent Cause of Undiagnosed Maladies in Children.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 22. Vol. 78. No. 16. p. 1197.

A discussion of the importance of the intestinal helminthiases is followed by reports of five cases of ascarid infection with symptoms resembling those of typhoid intussusception, convulsions, choking and vomiting, and acute toxaemia respectively.

R. T. L.

PESSÔA (Samuel B.). **A Case of Severe Ascaris Infestation.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 29. Vol. 78. No. 17. p. 1294. With 2 text figs.

A negro boy, aged 6, showed symptoms resembling abdominal tuberculosis. Examination of sputum and application of the intradermal test for tubercle were both negative and there was an 8 per cent. eosinophilia. Ascaris ova were found in the faeces. On treatment 558 ascarids were expelled, and abdominal symptoms disappeared at once and the pulmonary symptoms and the fever shortly after. Nervous symptoms were absent throughout, and there were no signs of intestinal obstruction. This was considered an example of mass infection, since all the worms were at about the same stage of development. The majority of the worms were immature.

R. T. L.

PENTAGNA (O.). **Ascaridiasi ed orticaria.** [Ascariasis and Urticaria.] —*Pediatria.* 1922. Apr. 1. Vol. 30. No. 7. pp. 308–313.

After a brief résumé of various opinions which have been held relative to the question whether ascaris secretes a poison or not, the author concludes that the toxicity of intestinal worms is not an established fact, though they are capable of "provoking certain organic reactions." Details of two cases are given.

The first, a child of 2½ years, a fortnight before being brought to hospital was attacked by fever and a morbilliform rash which faded in a few days and was succeeded by pain in the left iliac region and the passage of stools containing mucus and streaks of blood. The child was slightly rachitic. The abdomen was rigid and a swelling the size of a large egg was felt in the left lower quadrant; the left leg was kept flexed and attempts to extend it appeared to cause intense pain. Nothing else abnormal was noted except that the blood examination revealed a leucocytosis of 19,990 with 84 per cent. polymorphonuclears, only 1 per cent. eosinophiles. The fever and the swelling gradually subsided after admission to hospital, but on the 14th day there was an attack of urticaria with slow, irregular pulse, and these symptoms were noticed each time prior to the elimination of ascarides. As a result of treatment with santonin the worms were expelled and the other symptoms cleared up. A second case, a boy of 6 years of age, was very similar, except that there were no localising symptoms in the abdomen.

Urticaria in association with hydatid cysts has been noted repeatedly and accounted for by the suggestion that the albumen from the parasite may traverse the cyst wall, stimulate the production of antibodies and set up anaphylactic shock with urticaria as a symptom. The author expresses the opinion that the attacks of urticaria preceding each expulsion of ascarides in his cases may be explained in an analogous manner.

H. Harold Scott.

CALDWELL (Fred C.). **A Death caused by Ascarides.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 213–214.

A baby girl, aged 22 months, was treated with ½ minim of oil of chenopodium followed by Epsom salts and a saline enema. Innumerable ascarides were expelled in the faeces, and masses began to form in the abdomen. Ascarides came from the nose and mouth and collected in the throat, and death due to blocking of the larynx occurred 12½ hours after the beginning of the treatment. Ten hours after death ascarides were still issuing from the mouth.

R. T. L.

ASADA (Junichi). [**On the Cutaneous Infection by Ascaris, together with a Notice on a New Method of Cultivation of the Eggs of Ascaris.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. July. No. 2238. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 14.]

The author has made experiments to ascertain the probability of cutaneous infection in the field from hatched ascaris larvae and has arrived at positive results in experiments on animals.

R. T. L.

KONDO (Kiichi). [**Contribution to the Experimental Knowledge of Ascaris.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1922. Jan. No. 2263. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 112.]

Eggs of ascaris, cultivated in fertile soil, hatched and the larvae escaped into the soil. The author found that they would live for two months in the faeces and for more than one month in the soil.

R. T. L.

KOHGI (Chinichi). [**On the Histological Changes of the Animal Tissues caused by the Invasion of Ascaris. (II. Communication.) The Feature of the Leucocytes in the Circulating Blood.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. Dec. No. 2256. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 76.]

The author fed normal animals with ripe eggs of ascaris and examined the blood from the following day. The results showed an eosinophilia even before the ascaris was fully grown.

R. T. L.

BAER (Jean G.). *Tricocephalus dispar.* [Correspondence.]—*Lancet.* 1922. May 13. p. 968.

Professor FUHRMANN's method of finding the eggs of *T. dispar* is to add to a small quantity of faeces a few cc. of 20 per cent. HCl and shake well. A little ether is then added. The specimen is shaken and centrifuged. The eggs alone will then be deposited.

R. T. L.

DUQUE LINCE (E.). **Colitis tricocefaliana.**—*Repert. de Med. y Cirug.* 1922. Feb. Vol. 13. No. 5. (No. 149.) pp. 246–274.

The author ascribes a fourfold pathological effect to the presence of trichuris in the intestine, namely (1) irritant and inflammatory; (2) acting as a transmitter of bacteria; (3) toxic; (4) interfering with nutrition. By their direct action they produce small wounds, haemorrhages and foci of suppuration.

Of the various forms of diarrhoea resulting from their presence the commonest is a dysenteric type, more rarely sufficiently severe to be considered as enteric fever or tuberculous peritonitis.

The degree of anaemia may be excessive; the red corpuscles in one instance being reduced to 600,000 per cmm., due, he thinks, to frequent inoculation of small doses of *B. coli* through the wounds inflicted by the worm.

After trial of various drugs—kousso, male fern, eucalyptus, beta-naphthol, thymol, oil of chenopodium, and latex d'higuerón—the conclusion was reached that only the last had a specific action on the trichuris. The method of administration is as follows:—The patient is given a milk diet for two or three days and on the last evening he has a dose of calomel " to clear away the mucus and expose the worm." The next morning 40–60 gm. of the latex are given in two doses in a little milk at an hour's interval. If this does not act as its own purge castor oil or saline aperient is given.

H. Harold Scott.

SPRUIT (Charles B.). **The Treatment of Trichuriasis with Leche de Higueron.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 375–380.

Sap of Higueron possesses only a slight vermicidal action on ascaris and hookworm, but has a definite effect on the whipworm. The author treated 18 cases with fresh juice, the dose consisting of 16 cc. in half a cup of milk at 6 a.m. and repeated at 8 a.m. This was followed by 60 cc. of castor oil at 10 a.m. On the preceding day the patient had been given liquid diet only, and at 8 p.m. he had received 30 cc. of cream of tartar in a glass of sweetened water. In 11 cases, *i.e.*, 61 per cent., of this series, the parasites were voided [in no case numbering more than 13]. A second series of 12 cases were treated with chloroformed juice, the dose was raised to 20 or 30 cc., and magnesium sulphate was given in place of castor oil. In 6 cases, *i.e.*, 50 per cent., trichuris were passed and from 1 case 101 specimens were collected along with 125 hookworms. When the pure juice was used there were no subjective symptoms. Occasionally there was a temporary discomfort from a burning sensation in the rectum and around the anus. The chloroformed juice had a sickening sweet taste and gave rise to frequent eructations of gas. The addition of an equal amount of chloroform and storage in the icebox preserved the juice from fermentation. Tricresol 0·5 per cent. and glycerine 50 per cent. also prevented fermentation.

R. T. L.

KOBAYASHI (H.). [**Resistance of the Eggs of Helminthes against Various External Conditions.**]—*Mitt. med. Hochschule.* Keijo. 1921. Vol. 4. pp. 21–31. [Summarized in *Physiological Abstracts.* 1922. Apr. Vol. 7. No. 1. p. 13.]

The eggs of *Ascaris lumbricoides* survive for more than one month in urine, and for several days in 1–4 per cent. ammonia at low temperatures. They resist putrefaction of urine and develop in a strong solution of NaCl. Eggs of *Trichocephalus trichiuris* also resist putrefaction, but not salt. For the development of hookworm larvae traces of faecal matter are necessary; to kill the eggs the faeces should be left in contact with undiluted urine for at least one month.

R. T. L.

CORFIELD (C. Russell) & HIRSON (Bernard). **A Case of Acute Ascariasis associated with** *Trichuris trichiura* **complicating Pregnancy.**—*Lancet.* 1922. May 20. pp. 995–996.

The patient was a Turkish woman, three months resident in England and three months pregnant. A provisional diagnosis of acute gastroenteritis was made on admission. The patient presented a typical picture of starvation with severe vomiting. After santonin these symptoms rapidly subsided with expulsion of 30 worms, some of which were vomited, others passed in the faeces, together with two specimens of *Trichuris trichiura.*

R. T. L.

SEMON (Henry C.). **Trichotillomania due to Threadworms.**—*Brit. Med. Jl.* 1922. Apr. 22. p. 641. With 1 text fig.

Trichotillomania had persisted in this patient, a boy aged 6 years, since the age of 3. Epilation was mostly with the right hand from the left frontal area and was apparently unconscious, but was not practised during sleep. Latterly he had also pulled out his mother's hair. The boy was mentally bright, but his appetite was capricious, and threadworms had been noticed from the age of 18 months. Anthelminthic treatment, as recommended by STILL, was instituted. In a fortnight epilation ceased. A month later no relapse had occurred and the anaemia and appetite were improving.

R. T. L.

GLÄSER (Hans). **Die Empfindlichkeit von Ratte und Maus gegen Trichineninfektion.** [The Susceptibility of Rats and Mice to Trichinosis Infection.]—*Arb. a. d. Reichgsndhtsamt.* 1920. Dec. Vol. 52. No. 4. pp. 573–595.

The author's experiments agree with those of STAÜBLI in showing the great susceptibility of rats and mice to intestinal trichinosis. He has also established their susceptibility to muscle trichinosis. The average time at which the animals died after being fed with trichinosed flesh he calls the critical time. This critical time for intestinal trichinosis is 2–4 days after feeding, for muscle trichinosis 23–26 days.

In exceptional cases death can ensue from intestinal trichinosis on the 10th day and from muscle trichinosis on the 15th, 29th and 30th day. In one case it even occurred on the 70th day. Death does not depend on the amount of diseased meat eaten, but on the number of Trichinae it contains—in rats death follows after eating diseased pig's flesh containing 350 worms and after diseased rat's flesh containing about 8,000. For mice the " dosis mortalis " is about 1,200 Trichinae in rat's flesh. Death is due to toxins given off from the parasites—mice died after being subcutaneously injected with normal saline in which encapsuled muscle Trichinae had lain for an hour at 37° C. On account of their great susceptibility to Trichinae the author concludes that rats and mice are not the normal or principal hosts of these parasites, for death interrupts the life cycle. In some cases, however, where a " mortal dose " is not taken rats and mice can survive and so carry on the infection. Therefore, although the pig must be regarded as the principal host, the rat and mouse play the part of intermediate hosts and in places where pigs are suffering from trichinosis those vermin must be exterminated.

R. T. L.

DUCAS (Robert). **L'immunité dans la Trichinose.**—47 pp. 1921. Paris : Jouve & Cie., Editeurs, 15, rue Racine.

From a study of the development of immunity in rats against infection with *Trichinella spiralis* in which an aqueous extract of infected meat was used, the author found :—

(*a*) The Bordet-Gengou reaction inconclusive with sera of infected rats.

(*b*) The precipitin test negative except with very large quantities of antigen.

(*c*) The anaphylactic-ophthalmic reaction negative.

(*d*) No tolerance to the toxic effect of the extract after successive intraperitoneal injections into normal animals.

(*e*) The sera of infective animals had no curative or prophylactic value.

The author considers that rats show a certain degree of immunity against a second infection and that the resistance of the animals lies in the small intestine, since in rats surviving a second infection no adults can be found in the intestine. A similar absence occurs in the intestines of the hen, which is naturally immune to trichinosis.

R. T. L.

SCHWARTZ (Benjamin). **Effects of X-Rays on Trichinae.**—Reprinted from *Jl. Agric. Research.* 1921. Mar. 1. Vol. 20. No. 11. pp. 845–854.

Experiments made to determine the effect of X-ray radiation on Trichinae in pork were made in co-operation with a commercial firm with a view to its practical application. Apart from the fact that the expense may render the procedure impracticable, the author considers that much more experimental work is required to demonstrate whether this treatment could be depended upon to destroy Trichinae. Relatively heavy dosages of X-rays injure encysted Trichinae, but the injuries are not visible in the encapsuled larvae, and only become apparent when the larvae reach a suitable host in whose intestine they normally can develop. In such the Trichinae undergo rapid granular degeneration. Where lower dosages have been exhibited the encysted larvae continue to develop in the intestine, but do not attain structural or functional sex maturity. The sex cells appear to be atrophied and the X-rays appear, therefore, to have exerted a more or less selective action on the gonads of the Trichinae. There is considerable variation in susceptibility.

R. T. L.

SAWYER (W. A.). **Hookworm in Australia.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th August, 1920.* pp. 290–295. With 1 chart in text.

Although hookworm in Australia is serious it is confined to irregular areas with fairly sharp boundaries and determined principally in shape and position by the amount of rainfall. The influence of soil appears to be a minor factor. Where there is a high rainfall (over 50 inches) control measures become difficult. In Queensland there is an area of high prevalence in the region of high rainfall extending from Cooktown to Ingham. From Townsville to Bowen the infection and rainfall are low. Between Proserpine and Mackay the rainfall and infection are again high. Around Nambour and Landsborough there is considerable infection with high rainfall. South Australia State is entirely free from endemic hookworm disease. In Papua the natives on the plantations are highly infected. Towns built over the sea shore are almost free.

R. T. L.

CRICHLOW (Nathaniel). **Report on Hookworm Disease in the British Solomon Islands.**—*Jl. Trop. Med. & Hyg.* 1922. May 15. Vol. 25. No. 10. pp. 123–125.

Every island throughout the British Solomon Islands Protectorate is apparently infected with hookworm. The infection rate can be taken as 85 per cent. among the natives. The " worm " rate is low and not sufficient to cause any clinical manifestations. Bush villages show a higher incidence than saltwater villages. The author does not consider that the infection at the present time constitutes a danger to the natives, but advocates the treatment of infected persons and the control of the disease by the erection of sea or deep pit-latrines and the prohibition of promiscuous defaecation.

R. T. L.

CALDWELL (Fred C.). **An Accidental Infection with** *Uncinaria.*—*Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 51–52.

The history is given of the accidental infection of a laboratory worker with *Necator americanus.* Fluid containing larvae was allowed to run off a slide on to the thumb and middle finger. An intense itching immediately followed. On the following day the areas were inflamed and swollen and contained numbers of minute bright red points. Next day there was marked tenderness under the arm in the region of the axillary glands. On the day following marked bronchitis developed. The stools remained negative for more than a month, becoming positive 38 days after the infection. One treatment with chenopodium removed 20 hookworms and a second treatment proved negative and the faeces no longer contained ova.

R. T. L.

CAIUS (J. F.) & MHASKAR (K. S.). **The Correlation between the Chemical Composition of Anthelmintics and their Therapeutic Values in Connection with the Hookworm Inquiry in the Madras Presidency.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 787–798.

Oil of wintergreen has well-marked anthelminthic properties. Its action is vermicidal. Most of the worms are expelled dead and in a state of flaccidity. It does not remove Ascaris or Trichuris. It is a safe drug. No after-effects were noticed. The percentage of hookworms removed by a test treatment was 46·5 per cent. The anthelminthic value of pure methyl salicylate is practically the same as that of the oil. Salicylic acid and salol are ineffective against hookworms. Methyl salicylate, therefore, exerts a specific action in the unhydrolyzed state. Esterification of B-naphthol and thymol destroys their anthelminthic properties. The so-called " salol principle " cannot be extended to anthelminthics.

R. T. L.

MHASKAR (K. S.). **Delayed Cures in the Treatment of Hookworm Infection.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 799–803.

After one treatment with B-naphthol many cases of hookworm infection are not immediately cured, yet the faeces may become free from ova from 36 to 62 days later. The author regards a second treatment valueless in these cases and suggests that the worms may be affected by the drug and are carried down to the lower part of the intestine, where they are capable of surviving for a limited time only.

R. T. L.

GORDON (R. M.). **Ancylostomes recorded from Sixty-seven Post-mortems performed in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 223–228.

Six thousand eight hundred and fifty-seven ankylostomes were collected from 67 autopsies performed in the Santa Casa Hospital at Manaos during 1921–22. The proportion of *Ancylostoma duodenale* to *Necator americanus* was 1 : 4·7, whereas the proportion recorded for South Brazil by DARLING was 1 : 45. This is attributed to the high proportion in country dwellers who harboured *A. duodenale*. *A. brasiliense* occurred in four post-mortems. The author discusses the relationships of this form, which occurs in the cat and dog in Brazil. He differs from DE FARIA, who regards it as specifically distinct from *A. ceylanicum*. No constant difference could be detected in the size and shape of the inner tooth, nor could any difference be discovered in the length and fineness of the dorso-external ray in the two worms.

R. T. L.

SMILLIE (Wilson G.). **The Results of Hookworm Disease Prophylaxis in Brazil.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 77–95. With 6 charts.

In the Ilha do Governador, Brazil, the degree of hookworm infection four years after a successful intensive hookworm campaign and the installation of latrines in more than 80 per cent. of the houses proved microscopically to be at the rate of 70 per cent., as compared with a rate of 71·2 per cent. before the work was begun. Similar results have been reported from Ceylon, Porto Rico, and various other West Indian islands. These disappointing data may be interpreted in three ways: (1) our knowledge of the mode of spread of hookworm may be at fault; (2) the methods in use in combating the disease are inefficient; (3) the data from which these conclusions are drawn are incomplete and misleading. To obtain further light on the problem a re-survey of Ilha do Governador was recently made and the "worm count" method was used as an index of the degree of infection. Although the microscopical findings showed only a reduction of from 1–2 per cent. in the infection rate, the "worm count" method showed an average of 14 hookworms per case in contrast to an average of 329 hookworms in controls who had never received hookworm treatment. This showed that hookworm infection as determined by the microscopical examination of the faeces for ova is misleading. In a community where proper sanitary measures are being applied not only is there a decrease in the total number of worms harboured, but there is a change in the ratio of male and female worms harboured by the individual. Statistics show that while the two big factors in prophylaxis are latrine construction and intensive treatment, the effects of intensive treatment are evident even after three years in those individuals who do not instal latrines. Hookworm infection is, as a rule, slowly reacquired and rapid massive infections are rare. The soil was undoubtedly heavily infested with hookworm larvae when the campaign began, and the fact that there is not a heavy reinfection during the intervening years indicates that the larvae have not been able to survive a two-year period in the soil. It is unnecessary to institute soil disinfection in hookworm prophylaxis. In communities which have a high degree of hookworm infection, and in which it is impossible to convince the bulk of the community of the necessity of latrine construction and use, the method applied in large East Indian plantations of giving all the individuals a standard treatment of chenopodium once a year is undoubtedly efficient. It yields, however, temporary results only and has no great educative value.

R. T. L.

ACKERT (James E.). **Investigations on the Control of Hookworm Disease. IV. The Relation of the Domestic Chicken to the Spread of Hookworm Disease.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 26–38.

That hookworm eggs can retain their viability and hatch after passage through the gut of domestic chickens has long been known, but the extent to which these animals aid in the spread of the infection has hitherto remained undetermined. The author finds that although the eggs can remain viable and are able to hatch after passage, the great majority fail to produce infective larvae. To some extent dangerous infective spots may be established around drinking receptacles by chickens that have swallowed hookworm eggs day after day. Moreover, newly hatched hookworm larvae can pass, apparently uninjured, through the digestive tracts. A comparison of the reduction of mature larvae by fowls, with the establishment of infective spots, convinces the author that chickens are more beneficial than harmful in the control of hookworm disease in Trinidad.

R. T. L.

ACKERT (James E.) & PAYNE (Florence King). **Investigations on the Control of Hookworm Disease. V. The Domestic Pig and Hookworm Dissemination.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 39–50.

A high percentage of hookworm eggs ingested by pigs are able later to produce infective larvae, but infective larvae do not pass through the gut of the pig. *Strongyloides stercoralis* larvae survive passage through the pig and multiply in the faeces. Evidence was obtained pointing to the probability that *S. stercoralis* can parasitize the pig. Late in the season it was found that the pigs in Trinidad harbour a species of Necator which is named in this paper *N. suillus* n. sp. In a discussion of the bearing of this new factor upon their earlier experiments, the authors show that there is little reason to question their validity.

R. T. L.

CORT (William W.), AUGUSTINE (Donald L.) & PAYNE (George C.). **Investigation on the Activities of Infective Hookworm Larvae in the Soil. Preliminary Report.**—*Jl. Amer. Med. Assoc.* 1921. Dec. 24. Vol. 77. No. 26. pp. 2035–2036.

Both in natural conditions in the field and in laboratory experiments it is a common occurrence for the ensheathed larvae of the hookworm to moult and to continue their life in the unsheathed condition. Fifty-two per cent. to 98 per cent. of ensheathed larvae were found to have moulted when recovered from soil after 15 hours to 11 days. In no single case in a series of experiments were hookworm larvae found to have migrated a greater distance than 4 in. from the spot on the soil where they had been placed, during periods ranging from 15 hours to 42 days. The length of life of infective larvae under natural conditions does not exceed usually 6 weeks. These observations have an obviously important practical bearing on the general question of hookworm control.

R. T. L.

COMPERTS (H. C.). [In Dutch & English.] **Onderzoek naar den invloed van het gebruik van schoeisel op het aantal Mijnwormendragers. Investigations on the Influence of using Footwear on the Number of Hookworm-Carriers.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 8. pp. 120–131.

Investigations were made among the police at Sukabumi and their women and children living in the barracks to ascertain whether any conclusions could be derived therefrom as to the influence of footwear on the number of carriers. The women and children always go about barefoot. The young recruits had only been provided with shoes at the time of joining the ranks. A worm cure was administered and the stools were examined for two consecutive days. Of 417 recruits who had served for not more than one year, 81 per cent. were infected. These gave 16,199 worms, averaging 39 each. Of 200 police who had already served from 1–5 years, 70 per cent. were found to be carriers. From these 4,522 worms were expelled, averaging 23 per head. Of 130 police who had served from 5–7½ years, 31 per cent. were found to be infected; 3,342, or an average of 26, worms were expelled.

Of 173 women and children 68 per cent. were found to be carriers, with 4,090 worms, *i.e.*, on an average 40 per head.

The author concludes that the drafting of the senior men to other stations where hygienic control is often lacking explains the absence of any definite indication of the influence of footwear.

R. T. L.

SCHUURMANS STEKHOVEN, Jr. (J. H.), SCHUURMANS STEKHOVEN-MEYER (A. W.) & MAS SOERADJI. **Mijnwormbesmetting en bodeminfectie. Een onderzoek naar de verbreiding der anchylostomiasis, in verband met het voorkomen van mijnwormlarven in den bodem, Wonogiri, Residentie Solo.** [Hookworm Infection and Pollution of the Soil.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 680–736. With 1 text fig.

The spread of hookworm infection in some villages of Wonogiri (Middle Java) is discussed at considerable length. Much theory is produced on the relation between the number of eggs in faeces, the haemoglobin percentage of the carriers and the probable number of worms harboured, but there is no control by worm-cures to confirm the authors' views. Their calculations are based upon single examinations, whilst they quote cases in which the number of eggs in the stools varied considerably from day to day.

The loss of nutrition is considered to play an important auxiliary rôle in the causation of the disease.

A description is given of the villages under report in view of the breeding places of the hookworm. Samples of the soil were taken in different places and examined for larvae by Baermann's test.

General worm-cures and sanitary measures are suggested for the worst infested village. The possibility or impossibility of combating hookworm disease in Javanese villages could be proved in this way.

W. J. Bais.

RODENWALDT (E.) & RÖCKEMANN (W.). **Zur Biologie von** *Oxyuris vermicularis.*—*Cent. f. Bakt.* 1. Abt. Orig. 1921. June 28. Vol. 86. No. 5. pp. 421–424.

A case is cited in which young *Oxyuris vermicularis* larvae were found in the stools of a patient for 11 consecutive days. There are two possible explanations of this phenomenon: (1) the patient may have reinfected herself with an adult female worm and the developing larvae have passed straight through the gut on account of its abnormal pathological condition, or (2) development may have occurred in the intestine without the eggs first passing to the exterior. The first explanation is not probable, for during the 11 days no adult female was found in the stools and had the adult been ingested before examination the escaping larvae would have been more developed at the end of the time than at the beginning, which was not the case. If the eggs can develop into larvae in the large intestine it is probable that the grown larva does not normally find its way to the exterior but remains in the intestine, so that continual self-reinfection takes place.

R. T. L.

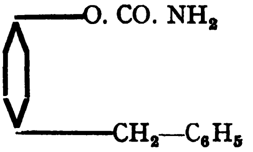
SCHICKHARDT (E.). **Butolan, ein neues Mittel gegen Oxyuriasis.** ["Butolan," a New Remedy for Oxyuriasis.]—*Muench. Med. Woch.* 1920. June 18. Vol. 67. No. 25. p. 722.

"Butolan," which is manufactured by Bayer & Co., is said to be chemically p-Benzylphenolcarbaminacidester. The author advises it as a cure for oxyuriasis, after using it on 26 cases in children of ages ranging from 2 to 12 years. The method adopted was as follows:—For three days 0·5 gm. "Butolan" was given two to four times daily (according to the age of the child), then with pauses of one or two days; the cure was repeated usually three times, and four times in very obstinate cases. Seven days after the complete course neither Oxyuris nor eggs could be found. After several months 22 out of the 26 children were still free from infection, though in the remaining 4 worms had reappeared. All the children stood the "Butolan" well, and even when bigger doses were given no harmful symptoms were noted either as regards intestines or kidneys. At the beginning of the course a laxative (calomel) was always given, and the anus was smeared with a mercurial ointment to prevent self-reinfection.

R. T. L.

FRANCKE. **Butolan, ein neues Anthelminthicum.**—*Med. Klinik.* 1920. July 22. Vol. 16. No. 29. pp. 754–755.

"Butolan" is a white, odourless and practically tasteless crystalline powder. It is insoluble in water, is easily taken even by small children, and causes no stomach or intestinal pains. It is the carbaminacidester of p-oxydiphenylmethane and has the following formula:—



In the body it breaks up into p-benzylphenol and carbaminacid. The former kills the oxyuris worms. It may be given in powders or tablets made up in 0·5 gm. The dose is one tablet three times daily for adults and older children, and for children under 10 years half a tablet three times daily. This dose is given on three consecutive days and is followed by a purgative. The writer has on several occasions given it for seven consecutive days, with a purgative on the 4th and 8th day. Adults can stand 1 gm. 3–4 times daily quite well, and this dose is recommended in severe cases. The cure may be accompanied by enemas, two of the most useful being a weak solution of aluminium acetate and onion water. Hygienic cleanliness must be strictly adhered to during the whole treatment. The results of this treatment have been excellent and seem to be permanent. Many of the children have been free of worms after the course of treatment from September to the following July; and only two of the author's patients have up till now proved refractory. The author has no doubt of the great value of "Butolan," although he realizes that it is still too soon to give a final opinion.

R. T. L.

SCHÜLE. **Ueber die Behandlung der Oxyuren mit "Butolan."** [Treatment of Oxyuriasis with "Butolan."]—*Med. Klinik.* 1920. Sept. 9. Vol. 16. No. 36. p. 927.

The firm of Bayer & Co. recently sent some of the new helminthicide, "Butolan," to the author; in the few cases in which it was tried recovery was so quick and thorough that the author is very hopeful that it may be of real value. The dose causes no unpleasant symptoms, even in children with a very sensitive stomach. So far it has not been possible to prove whether the cure is permanent or not.

R. T. L.

SELTER. **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Deut. Med. Woch.* 1921. July 7. Vol. 47. No. 27. pp. 778–779.

"Butolan," a "Karbaminsäureester" of p-Oxydiphenylmethane, is recommended as a vermicide lacking the usual unpleasant characteristics of these drugs. 0·2–0·5 gm. is given thrice daily for 2–3 days, followed by a purgative. The course of treatment is repeated a fortnight later. During this interval the usual precautions against reinfection are taken. Enemata are unnecessary. The preparation is now being made up in tablets of 0·5 gm., which can be broken into two portions for administration to children. Seventeen cases, aged from 1 to 15 years, were observed clinically. They remained free from Oxyuris for some months.

R. T. L.

OCHSENIUS (Kurt). **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Muench. Med. Woch.* 1921. June 24. Vol. 68. No. 25. p. 778.

The author uses as an anal ointment:—

Anaesthesine	2·0 gm.
Acid salicylici	0·5 gm.
Vaselin or lanolin	20·0 gm.

It is well known that diet has an influence on oxyuriasis. Bulky vegetables, such as purées of swedes, are often given to induce a natural laxative action. When the faeces are loose more parasites are found in the rectum and anus, the worms becoming detached by the increased peristaltic action. If cocoa and chocolate with fresh fruits, jams and green vegetables are taken the worms apparently disappear at once. On the other hand, if the constipating elements are eliminated the worms are again seen. These facts have a practical value; theoretically they may explain the large increase of oxyuris during the war, due according to this, to the large quantity of vegetable stuffs eaten and the increased peristalsis resulting.

R. T. L.

FRANKE (Felix). **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Muench. Med. Woch.* 1922. Jan. 6. Vol. 69. No. 1. pp. 17–18.

For the last five years the author has ceased to use any internal remedy in the treatment of oxyuriasis with the exception of occasional use of Gelon aluminii subacet. He advises the following hygienic treatment: in addition to extreme personal cleanliness, continual changing of bed-linen, cleaning and washing of bed-hangings and mattress, with beating and brushing of these in the open air where possible. Mercury ointment is to be used 2–3 times a day after evacuation, the anus being carefully washed before every application. Closed drawers must be worn day and night. Finally the finger-nails must be kept closely cut and well scrubbed. Where these precautions have been carefully carried out for a month the author has never found the cure to fail.

R. T. L.

BURNELL (Glen H.). "*Oxyuris incognita*" **in Australia.**—*Med. Jl. Australia.* 1921. Oct. 29. 8th Year. Vol. 2. No. 18. pp. 374–375. With 4 text figs.

The occurrence of the eggs of *Oxyuris incognita* in human stools was first recorded in Brisbane, Australia, in September, 1920, in two persons belonging to the same family Further investigation has shown a total of 57 cases of infection out of 12,539 persons examined in Brisbane. As in America, the ova were found at a definite period of the year; between January 24 and April 18, 1921, 52 of these 57 cases occurred during the first four weeks, while the remaining five cases were noted during the next eight weeks. An attempt made to infect rabbits with the eggs yielded a negative result. The paper gives text-figures of the eggs and of the developing embryo retained within the shell.

R. T. L.

CALVIN (Joseph K.). **Native Infestation by the Broad Tapeworm,** *Diphyllobothrium latum.*—*Jl. Amer. Med. Assoc.* 1922. Jan. 14. Vol. 78. No. 2. pp. 84–85.

Notes of two cases of infestation in children born and living entirely in Chicago. In the first, a Jewish girl, the food consisted partly of fish coming mostly from Lake Michigan. In the second, some uncooked smoked fish was eaten during the winter; all other fish consumed was cooked. In neither case was there secondary anaemia.

R. T. L.

WALLACE (J. C.) & GRANT (Margaret). **Infestation by Broad Tapeworm.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 8. Vol. 78. No. 14. p. 1050.

Native-born patients in Chicago harbouring *Dibothriocephalus latus* have been reported by CALVIN (see above). A case is described by the authors from Indiana. The blood examination showed 85 per cent. haemoglobin.

R. T. L.

ANDO (Akira) & ITO (Shiro). [**A Contribution to the Study of** *Dibothriocephalus latus.* **On** *Dibothriocephalus latus* **occurring in Man and Frog.**]—*Iji Shimbun* (*Med. News*). 1921. Dec. No. 1083. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 112.]

Frogs from a region where four cases of human Dibothriocephalus were found were nearly all infected with larval stages of this worm. When placed in tap water, distilled water or pond water, these larvae quickly died, but survived longer in milk and in saline solution, and for a long time in Locke's and Ringer's solutions. The digestive fluid had little effect. The worm was able to survive 52 days in human serum. The larvae developed to mature worms both in the dog and the cat. Histologically and morphologically the larvae in man and in the frog were identical.

R. T. L.

HERZOG (Fr.). **Zur Kenntnis der Bothriozephalusänamie.**—*Muench. Med. Woch.* 1920. Nov. 26. Vol. 67. No. 48. pp. 1383–1385.

In this case of Bothriocephalus anaemia the blood showed the same constitution as in pernicious anaemia, but all other symptoms were lacking. Bothriocephalus anaemia must not be identified with pernicious anaemia and the composition of the blood must not be taken as the sole diagnostic symptom of the latter disease. Evidently the bone marrow reacts in the same way to different stimuli. In this case there was widespread pigmentation of the skin, which the author looks upon as haemochromatosis.

R. T. L.

BECKER (Gösta). **Versuche mit der Sachs-Georgi Reaktion an Bothriocephalusträgern.** [The Sachs-Georgi Reaction in Bothriocephalus Hosts.]—*Acta Med. Scandinavica.* Stockholm. 1922. Vol. 56. No. 4. pp. 453–460.

An extract was prepared by treating the washed Bothriocephalus with 90 per cent. alcohol for 24 hours, filtering the extract and allowing it to stand for another 24 hours, after which time the supernatant fluid was removed and allowed to stand for 24–72 hours, when no precipitation occurred. The clear crude extract was diluted with 90 per cent. alcohol and physiological saline and 1 per cent. of an alcoholic solution of cholesterin was added In the tests inactivated sera, were employed and the results showed the antigen to be valueless since it reacted equally well with sera from parasitized and non-parasitized subjects.

R. T. L.

CHOLODKOVSKY (N.). **Sur un nouveau parasite de l'homme.**—*Jl. Russe de Zoologie.* 1916. Vol. 1. No. 1. pp. 235–237. With 1 plate & 6 figs. [In Russian, pp. 231–234.]

The author creates a new species named *Dibothriocephalus minor* for a specimen passed, after treatment, by one of the members of an expedition sent from Russia to Transbaikalia. The strobila was about 10 cm. in length. The greatest breadth did not exceed 6 mm. The scolex was nearly quadrangular, blunt, and measured 1·5 mm. by 0·75 mm. There was no neck, the segments commencing immediately behind the scolex. Towards the posterior end the overlapping of the segments give the strobila a serrated margin. The uterus is apparent at 3 cm. from the scolex and has an irregular sac-like outline, not the characteristic rosette of *D. latus*. The eggs are oval, 0·07 by 0·04. This parasite is said to differ from *D. latus* and *D. cordatus* of man, also from *D. fuscus* and *D. serratus* of the dog and *D. felis* of the cat, by its shape and the size of the strobila and the structure of the scolex and uterus.

R. T. L.

HODSON (V. S.). **Tapeworm Hospitality.** [Correspondence.]—*Lancet.* 1921. Apr. 2. p. 728.

A patient in Khartoum Civil Hospital, treated once in the ordinary way with filix mas, has produced 31 specimens of *Taenia saginata.*

R. T. L.

CHANDLER (Asa C.). **Species of Hymenolepis as Human Parasites.**—*Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. pp. 636–639.

It appears reasonable to the author that the very heavy human infestations with *H. nana* are the result of internal auto-infection. Recently JOYEUX has discovered cysticercoids in the intestinal villi of the European hedgehog, which apparently belong to the species commonly found in that animal. JOYEUX failed to infect rats with eggs from the human *H. nana*, and the author has had a similar experience. The evidence is in favour of the conclusion that rat and human parasites are distinct. It is presumed that *H. nana* has departed farther from the ancestral habits and has entirely lost the ability of developing in an intermediate host which its relative *H. murina* still retains. Three new cases of the occurrence of *H. diminuta* in the United States are recorded.

R. T. L

BURNELL (Glen H.). ***Hymenolepis diminuta* in Human Hosts.**—*Med. Jl. Australia.* 1922. Mar. 4. 9th Year. Vol. 1. No. 9. pp. 236–237.

During the Australian Hookworm Campaign 3 cases of *Hymenolepis diminuta* were noted in quick succession in children in Rockhampton. As only 12 cases of human infection are on record, the author considers it possible that infections with this parasite may have been attributed in many cases to *H. nana,* owing to the resemblance of their ova. The ova may be differentiated as follows :—

Hymenolepis diminuta.	*Hymenolepis nana.*
" (*a*) The ovum has a definite greenish tinge, this being especially marked in the shell.	" (*a*) The ovum is almost colourless, what colour there is being a delicate pink.
" (*b*) Diameter : 65 μ to 70 μ.	" (*b*) Diameter : 40 μ to 50 μ.
" (*c*) Diameter of onchosphere roughly half that of the ovum.	" (*c*) Diameter of onchosphere, roughly two-thirds of that of the ovum.
" (*d*) The onchosphere has a small papilla and filaments are absent.	" (*d*) Papillae and filaments well marked.
" (*e*) Hooklets tend to be in the short axis of the onchosphere.	" (*e*) Hooklets tend to be in the long axis of the onchosphere."

R. T. L.

FAIRLEY (K. Douglas). **The Results of an Analysis of Thirty-three Cases of Hydatid Disease of the Lung.**—*Med. Jl. Australia.* 1922. Apr. 1. 9th Year. Vol. 1. No. 13. pp. 346–355.

The 33 cases analysed in this paper were admitted to the Melbourne Hospital during the last twelve years. In 27 the affected site was the lower portion of the right lung ; in 2 at the apex of the right lung, and in 4 the cyst occurred in the left lung. This remarkable distribution cannot be explained by any theory involving the passive migration of the embryo in the bloodstream. It seems probable that the embryo usually reaches the liver passively by the portal circulation. The right lobe of the liver is the part most frequently affected, and from here an active migration of the parasite would quickly bring it to the lower lobe of the right lung, where it is found so frequently. The distance from the liver through the diaphragm to the lung is less in children than in adults, and this may explain the relative frequency of pulmonary hydatid in the former.

The paper deals extensively with the physical signs and symptomatology of pulmonary hydatid disease. Haemoptysis was noted in 57·6 per cent. of the patients, dyspnoea in 27·3 per cent. Cough occurred in every case. Sweating, wasting and fever occur chiefly with suppurating or ruptured cysts. Differential diagnosis of varieties of lung infections simulating (*a*) hydatid of the liver, (*b*) phthisis, (*c*) malignant disease of the lung, (*d*) pleural effusion, (*e*) pneumonia, is fully discussed. Briefer reference is made to the value of X-rays and to biological aids to diagnosis. In regard to prognosis the author considers the immediate outlook good if operation is performed, but the later prognosis should be more guarded, as in 39·4 per cent. of the cases under review there was multiple infestation and in more than half further surgical procedure was required within a few years.

R. T. L.

FAIRLEY (N. Hamilton). **Researches on the Complement Fixation Reaction in Hydatid Disease.**—*Quarterly Jl. of Med.* 1922. Apr. Vol. 15. No. 59. pp. 244–267.

——. **The Complement Fixation Test for Hydatid Disease and its Clinical Value.**—*Med. Jl. Australia.* 1922. Apr. 1. 9th Year. Vol. 1. No. 13. pp. 341–346.

An alcoholic extract of cyst wall was found to be inactive as an antigen for echinococcal infections; and similar extracts of *dried* hydatid fluid were not good. An extremely good antigen could be prepared by treating *moist* scolices with absolute alcohol and this extract was never found to give any pseudo-positive reactions. The author agrees with WEINBERG that the immune body appears in the serum owing to the filtration of hydatid fluid into the tissne.

R. T. L.

CAWSTON (F. G.). **Antimony in the Treatment of Lepers and Hydatid Disease.**—*Jl. Trop. Med. & Hyg.* 1922. Feb. 1. Vol. 25. No. 3. pp. 27–28.

In this paper on the treatment of leprosy with colloidal antimony the author mentions a case of hydatid cyst of the liver which he treated apparently successfully by intramuscular injection of 38 cc. of Crooke's colloidal antimony with 6½ gr. of emetine hydrochloride, the doses ranging from 2–9 cc. of colloidal antimony and the treatment extending over three weeks. The eosinophilia fell from 16 per cent. to 8 per cent. in four weeks from the commencement of treatment. While the first skiagram showed a definite cyst, only a faint shadow, such as was observable in a case operated on twelve years previously, remained after treatment.

R. T. L.

TREMATODES.

BRODEN (A.). **Un cas de bilharziose rectale chez l'Européen au Congo Belge.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 171–173.

CAWSTON (F. G.). **Bilharzia Infection in the Pool, the River, and the Lagoon.**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 16. Vol. 25. No. 2. pp. 16–18.

CAWSTON (F. G.). **Bilharzia Disease in South Africa.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 975.

DOLLFUS (Robert Ph.). **Sur la présence en France et en Corse du** *Bullinus contortus* **(Michaud), hôte intermédiaire de** *Schistosoma haematobium* **(Bilharz). Note préliminaire.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 208–212.

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BECKETT (T. G.). **The Treatment of Hydatid Disease.** [Correspondence.]—*Med. Jl. Australia.* 1922. Jan. 7. 9th Year. Vol. 1. No. 1. p. 27.

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DE GIRONCOLI (Franco). **Ascaridi lumbricoidi in un' ernia crurale strozzata.**—*Riforma Med.* 1922. Jan. 30. Vol. 38. No. 5. pp. 102–104.

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NEUDÖRFER (Arthur). **Ueber Askaridiasis der Gallenwege.**—*Wien. Klin. Woch.* 1922. Feb. 23. Vol. 34. No. 8. pp. 179–180.

PATTERSON (Harold A.). **Experiences with Hookworm.**—*Milit. Surgeon.* 1922. May. Vol. 50. No. 5. pp. 562–569.

RUIZ ARNAU (Ramón). **Filariosis en su relacion con otras Linfopatias tropicales.** —*Bol. Assoc. Med. de Puerto Rico.* 1922. June 30. Vol. 16. No. 137. pp. 95–100.

STRATER (P.). **Operativ geheilter Fall von Askaridenileus.**—*Zentralbl. f. Chirurg.* Leipzig. 1921. Aug. 20. Vol. 48. No. 33. pp. 1188–1189.

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UNCLASSED.

DE ALMEIDA (Junior) (Theophilo). **O chenopodio e a sua toxidez.**—*Brazil Medico.* 1922. June 17. Year 36. Vol. 1. No. 24. pp. 324–326.

LEITE (Raul). **O oleo essencial de chenopodio e sua toxidez.**—*Brazil Medico.* 1922. June 24. Year 36. Vol. 1. No. 25. pp. 340–341.

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ONORATO (Raffaele). **Un caso di morte per avvelenamento da tartaro emetico.**—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1921. Mar.–Apr. Vol. 2. No. 3–4. pp. 33–53.

PEQUENO (Junior) (Pio Alves). **O chenopodio e sua toxidez.**—*Brazil Medico.* 1922. Apr. 15. Year 36. Vol. 1. No. 15. pp. 185–186.

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

STILES (C. W.). **The Public Health Status of Amoebic Dysentery in the United States as potentially influenced by the World War.**—*Boston Med. & Surg. Jl.* 1922. Mar. 23. Vol. 186. No. 12. pp. 377–379.

This paper refers to the microscopic examination of 13,043 faecal specimens from 8,029 persons in 48 institutions, located in 22 States and the District of Columbia. Of these persons 39·9 per cent. (3,208) showed protozoa and 9·6 per cent. (775) worms; 333 persons (4·1 per cent.) showed infection with *Entamoeba histolytica.* Of 196 immigrants at Ellis Island 8·6 per cent. (17) were infected. Of 329 American boys and girls in a training school in Columbia 17·3 per cent. were found infected as a result of 5·2 examinations per case. Of 1,547 civilians 8·3 per cent. (129) were in a similar condition, indicating a probable total infection of 13–17 per cent. Of 83 American boys and girls in another training school in Columbia an average of 5·5 examinations per case revealed 12 per cent. (10) as infected. Of 2,584 soldiers who did not go to Europe, an average of 1·3 examinations showed 3·5 per cent. (93 cases) infected, indicating a probable total of 8–9 per cent. Of 3,536 soldiers who returned from Europe, an average of 1·1 examinations per case revealed 2·8 per cent. (100) as infected, thus indicating a total of 7·8–9 per cent. Of 362 persons of unknown military history 1·5 examinations per case uncovered 3 per cent. (11) as infected, indicating a total of 9 per cent.

The conclusion would seem justified that on an average the soldiers who had served in Europe were not infected with amoebic dysentery any more than are certain other elements of the population. It is clear then, that no large expenditure of money with the object of searching out and treating infected individuals is justifiable. As far as the rates of infection are concerned, it is safe to concede the point that they are higher than was conceived to be possible before the war, but, as far as the significance of the figures is concerned, we must revise former conceptions and must conclude that the "carrier" of amoebic dysentery is not a great menace to his neighbours.

The intensive studies on intestinal protozoa conducted during and since the war bring out clearly two practical facts:—

(1) At least in temperate climates, the intestinal protozoa of man are by no means of so much clinical importance as has been assumed. The average case of infection is usually of such slight importance from a clinical point of view that it can be ignored. A routine examination for intestinal protozoa or helminths is not called for in every case of disease; on the contrary, it is only in tropical and sub-tropical localities that the expense can be justified as a matter of administration; in northern localities, this examination should in general depend on symptoms.

(2) At least in temperate climates, *Entamoeba histolytica* is not usually a serious parasite, and its presence in healthy carriers is common. This is not to be interpreted as meaning that it is not a serious menace in the tropics and sub-tropics. Próbably no person would question the seriousness of amoebic dysentery in the Southern States.

P. H. Manson-Bahr.

Ellis (Aller G.). **Amebiasis.**—*Bulletin of the Ayer Clinical Laboratory of the Pennsylvania Hospital.* Philadelphia. 1922. May. No. 7. pp. 7–56. With 8 figs. in text.

In his introductory remarks the author says that "the time . . . appears opportune for a brief statement of salient points about the pathogenic ameba and its effects on the human body": and he therefore sets out to give "a review of the subject," together with a "report of twenty-three cases of amebic dysentery personally studied post mortem in Bangkok." These cases are, he believes, the first to be described in detail from Siam.

In his preliminary review the author discusses the geographical distribution of amoebiasis; the intestinal amoebae of man; the lesions caused by *E. histolytica*; the diagnosis and treatment of amoebic dysentery; amoebic abscess of the liver, and other lesions of secondary amoebiasis. Although 93 other works are referred to, the author's study of the literature appears to have been by no means exhaustive; and his discussions are often marred by his impartiality—truth and error, good work and bad work, being set down side by side as though they were all equally worthy of credence and respect. [It seems to the reviewer that uncritical compilation of this character no longer serves any useful purpose.] Many of the author's statements are, moreover, open to very serious criticism. For example, it is alleged that amoebiasis has spread recently from the tropics to other parts of the world (p. 7), and the references to recent English work (pp. 8, 9) contain several important mistakes. [The observations here attributed to Yorke are those of Malins Smith and Matthews, and the opinion attributed to the Medical Research Council is in reality that expressed by the present reviewer. The author seems to have completely misunderstood the significance of much of the work done on intestinal protozoa in England during the War.] On pp. 24–25 the author tells us that "the diagnosis of *E. histolytica* . . . . practically resolves itself into distinguishing between the *histolytica* and *coli*": while the suggestion (p. 25) that "if entamebae are in numbers in the stools of a person having acute or subacute dysentery, for purposes of diagnosis they should be regarded as the histolytica" he calls "a very practical conclusion." The section on treatment is deficient in many ways; and as most of the English work carried out during the War is ignored, it can hardly be regarded as the last word on the subject. From these and other omissions and imperfections it seems clear that the author, in his "review," has no message to deliver to readers of this *Bulletin.*

Although the "review" occupies about 32 pages, and the description of cases less than half this number, the latter section is, nevertheless, the more valuable of the two. The 23 cases comprised 13 males and 10 females, but unfortunately their nationality is not explicitly stated (? Siamese). Amoebic abscess of the liver was found in four; but the most noteworthy observation relates to the involvement of the small intestine—no less than nine cases out of the 23 showing lesions in the ileum. The author says "I believe that in all nine cases the lesions were amebic, though amebae were actually found in only two of the five cases studied microscopically": and it is thus permissible to doubt whether his interpretation was always correct—more especially as no bacteriological study of these cases appears to have been made. It is contrary to the experience of other workers to find the small bowel involved in so large a proportion of cases (40 per cent); and the author's conjectures that "*E. histolytica* is more active in Siam" than elsewhere, or that " the people there are less resistant," seem scarcely adequate to explain his conclusions—as he himself appears to allow. On an earlier page (p. 28) he notes that he was unable to find Charcot-Leyden crystals in the stools of any of his patients. Apart from these observations the cases yield no information which has not been recorded many times before.

Clifford Dobell.

HAGE. **Zur Frage des Vorkommens autochthoner Amöbenruhr in Deutschland (nach Stuhluntersuchungen in Thüringen).** [Occurrence of Autochthonous Amoebic Dysentery in Germany (based on Stool Examinations in Thuringia).]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 107–113.

This paper is replete with tables, and records systematic stool examinations of 400 people from all parts of Thuringia as follows :—

—	Number of persons examined.	Number infected with protozoa.		Number infected with helminths.	
Children ♂ ..	34	4	11·8 per cent.	2	6 per cent.
Children ♀ ..	40	4	10 ,,	3	7·5 ,,
Adults ♂ ..	160	63	39·4 ,,	8	5 ,,
Adults ♀ ..	166	64	39 ,,	16	9·6 ,,
Total ..	400	135	33·8 ,,	29	7·3 ,,

—		Protozoa.												
		Amoebic Cysts.								Flagellate Cysts.				Protozoa of all kinds.
		E. histolytica.		*E. coli.*		Iodamoeba.		Limax type.		*Trichomonas intestinalis.*		*Lamblia intestinalis.*		
			per cent		per cent		per cent		per cent		per cent		per cent	
♂ Children	34	–	–	3	8·8	–	–	–	–	–	–	1	2·9	—
♀ Children	40	–	–	4	10	–	–	–	–	–	–	–	–	—
♂ Adults	160	2	1·3	55	34·4	10	6·3	–	–	4	2·5	7	4·4	7
♀ Adults	166	1	0·6	62	37·3	8	5·0	1	0·6	5	3	6	3·6	8
Total	400	3	0·8	124	31	18	4·5	1	0·3	9	2·3	14	3·5	—

An attempt was made to differentiate, as regards their liability to infection with protozoa, between town and country dwellers ; the difference is not a great one, but by far the highest proportion—44 per cent.—was found in lunatics.

76 inhabitants of one village were likewise examined :—

—	*E. histolytica.*		*E. coli.*		Iodamoeba.		Limax amoeba.		*Trichomonas intestinalis.*		*Lamblia intestinalis.*	
				per cent.								
Children .. 32	—	—	6	18·7	—	—	—	—	—	—	—	—
Adults .. 44	—	—	12	27·3	—	—	—	—	—	—	—	—

Six families, consisting of 18 persons, all in good health and belonging to the working class, were also subjected to the same thorough investigation. In persons so closely associated as these people are a relatively high infection with *E. coli* (55·5 per cent.) and Iodamoeba (33·3 per cent.), *Trichomonas intestinalis* (16·6 per cent.), *Lamblia intestinalis* (16·6 per cent.) was revealed.

Of the persons infected with *E. histolytica* prolonged enquiries elicited the fact that in all but one the original infection was probably contracted outside Germany. There was one autochthonous case.

P. H. M-B.

FRANCHINI (Filippo). **Amebiasi nella provincia di Bologna.—I. Dissenteria amebica nell'uomo.** [Amoebic Dysentery in Man.]—*Pathologica.* 1921. Nov. 1. Vol. 13. No. 311. pp. 529–544. With 1 plate.

The author states that he reported an epidemic of amoebic dysentery in the province of Bologna in Italy in 1919. A second was noted in 1920 in Capofiume in the same province, and during it he examined 18 cases. He states that there was a simultaneous outbreak amongst cats, which he proved to be due to the dysentery amoebae.* There then follows a long dissertation on the characters of the amoebae as seen by him and a comparison of his own observations with those of other observers. Taking into account the admitted fact that stools did not reach him till at least twelve hours after they had been passed, as he was working 40 kilometres away from the epidemic, it is perhaps not surprising that he should have produced a plate of 53 figures hardly any one of which can be recognized as an amoeba at all. That any observer should have considered it worth while to illustrate a work with such drawings at the present time is surprising and leads one to hesitate in accepting statements as to the nature of the epidemic in human beings and cats. It is extremely probable that *E. histolytica* infections are endemic in Italy and that cases of actual amoebic dysentery occur fairly frequently, but to style the small series of cases seen by him an epidemic seems hardly logical. It seems perfectly clear that the author has little, if any, knowledge of the human intestinal amoebae.

C. M. Wenyon.

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* FRANCHINI (F.). Dissenteria amebica spontanea nel gatto concomitante ad una circoscritta epidemia di dissenteria nell'uomo in una comune del Bolognese. Nota preventiva.—*Giorn. di Clinica Med.* Bologna. 1920. Sept. Vol. 1. No. 9. pp. 352–353.

i. DREYER (F. J. F.). **Tilfælde af Amöbedysenteri.** [Case of Amoebic Dysentery.]—*Hospitalstidende.* Copenhagen. 1920. Oct. 6. Year 63. No. 40. Medicinsk Selskab for Fizens Stifts Forhandlingar. pp. 17–19.

ii. HANSEN (I.). **4 Tilfælde af Amöbedysenteri behandlet med Emetin.** [Four Cases of Amoebic Dysentery treated with Emetine.]—*Ugeskrift for Læger.* 1921. Dec. 8. Vol. 83. No. 49. pp. 1625–1633.

i. This is a short account of a case of amoebic dysentery observed in a patient in a Danish hospital—a sailor of 24, who had contracted the disease in China. It appears to have been a typical case, presenting no unusual features. The stools were bacteriologically negative, and contained numerous active amoebae with ingested red corpuscles. The patient was treated with emetine, silver nitrate injections (intrarectally), and tannin (rectally and subcutaneously).

ii. A short paper recording four ordinary cases of amoebic dysentery seen in a hospital at Copenhagen. The patients contracted dysentery, respectively, in Canton, the West Indies, Africa, and Teneriffe, and they were all, therefore, evidently relapse cases—not indigenous Danish cases of amoebic dysentery. They all cleared up under emetine treatment, but none of them remained under observation for any length of time afterwards.

According to the author of this paper, these four cases and that of DREYER (i, *supra*) are the only cases of amoebic dysentery recorded up to the present in Denmark.

Clifford Dobell.

SPOLVERINI (L.). **Sulla dissenteria amebica infantile.**—*La Pediatria.* 1922. Jan. 1. Vol. 30. No. 1. pp. 1–11.

Many practitioners, well acquainted with amoebic dysentery in adults, overlook the condition in children in the belief that those of tender years are not subject to the disease. Several cases, however, of enterocolitis in children in the hot season have proved to be amoebic dysentery. The likelihood of erroneous diagnosis was all the greater in that in some parts of Italy amoebic dysentery had not been met with until the return of soldiers in the late war.

Five cases, of ages from 2½ to 12 years, are recorded in detail; four of these had been diagnosed and treated for a long time as enterocolitis. Examination of the stools was then carried out and the *Entamoeba histolytica* discovered. Specific treatment with emetine led to a rapid clearing up of the condition. In the remaining case more than one course was necessary. There is nothing calling for special remark, the cases being quite straightforward.

H. H. Scott.

FERRO (Paolo). **Sulla dissenteria amebica.**—*Giorn. di Clin. Med.* Parma. 1921. Feb. 10. Vol. 2. No. 3. pp. 81–86.

Three cases are reported of atypical amoebic dysentery and a fourth case of chronic amoebic dysentery which, after treatment for 30 months with dieting and astringents, was cured by three series of emetine injections of 1·02 gm. (in 10 days), 0·72 gm. (in 7 days), and 0·54 gm. with intervals of 10 and 14 days between the series.

In discussing the diagnosis of amoebic dysentery the writer lays especial stress on the importance of the search for vegetative forms of the amoeba in fresh stools diluted with tepid sterile salt solution. He mentions with approval the method of radioscopic examination with the aid of artificial pneumothorax in fixing the site of liver abscess. This method was recently described by IZAR (*Radiologia medica*, 1921).

J. Rosslyn Earp.

LICHTENSTEIN (A.). **Therapeutische Schwierigkeiten bei der Amoebiasis des Darmkanals.** [Therapeutic Difficulties in Amoebiasis.] —Reprinted from the *Verhandlungen des 4en Kongresses der "Far Eastern Assoc. of Trop. Med."* 8 pp. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

In this paper recent methods of treating amoebiasis are passed under review. The author speaks highly of neosalvarsan in this condition, both when given intravenously (course totalling 2·1 gm.) and when swallowed in cachets; in the latter case there is, of course, the danger that the capsules will be passed through the intestinal tract unchanged. He believes that this method will remain as the "*ultimum refugium*" in amoebiasis. He also believes in *Oleum chenopodii,* but in neither instance is he able to do more than generalize.

P. H. M-B.

WATCH (N. B.). **Amoebic Dysentery in New Guinea.** [Correspondence.]—*Med. Jl. Australia.* 1922. June 3. 9th Year. Vol. 1. No. 22. p. 621.

In the medical report of German New Guinea for the year 1909–10 there were 109 cases of *Entamoeba histolytica* infections reported. Since there is some doubt in Australia as to the existence of amoebic dysentery in New Guinea, a typical case is recorded.

P. H. M-B.

SMITH (J. Forest). **Solitary Abscess of the Liver.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Apr. Vol. 15. No. 6. pp. 24–26.

This paper embodies an investigation of cases of solitary abscess of the liver treated in St. Thomas' Hospital during the last 25 years.

In 1920 a child, aged 5, was admitted with a history of passage of blood and mucus *per rectum* at first thought to be the result of intussusception. Examination of the faeces revealed *Entamoeba histolytica* in numbers. The child recovered on emetine bismuth iodide. The possible source of infection was an uncle, living in the house, who had recently returned from war service in the east, where he had contracted dysentery.

The series is divided into two groups: the first consists of 29 cases in which a history is given of residence in countries in which amoebic dysentery is endemic; the second group contains 3 persons, none of whom had been abroad.

In the first group the majority admitted previous dysentery; 3 had been previously treated for liver abscess. Up to the year 1909 there had been 15 cases with 10 deaths, whilst from 1910 to 1921 there were 14 cases with only 1 fatal result. Two cases are described as "resolution by expectoration." In one fatal case, in which at post-mortem examination a track from an abscess in the right lobe to the right bronchus was shown, amoebae had been found in the sputum. In one case the occurrence of severe pain in the right lumbar region intensified by exertion led to exploration. Sixteen days later the patient died suddenly from pulmonary embolism and the cause was found to be a solitary abscess of the liver. The provisional diagnoses are of interest. One was sent in as a cirrhosis, whilst empyema, pleural effusion and unresolved pneumonia were common errors.

Of the second group one apparently was a true amoebic abscess, as follows :—

A woman, aged 25, was admitted in 1920 with a history of hepatic pain and emaciation. Fever of a hectic type was present. The abscess was opened and drained ; the pus, chocolate in colour, was sterile on culture. The patient had always resided in England and her husband was an ex-soldier who had had dysentery during the war.

In the other two the etiology was suggestive, but by no means so certain ; one was a boy of 13, the other a man aged 26, in whom the illness proved fatal.

P. H. M-B.

MIGINIAC. **Deux observations d'abcès du foie ouverts dans les bronches. Drainage transcostodiaphragmatique. Traitement complémentaire par l'émétine. Guérison.**—*Bull. et Mém. Soc. Chirurg. de Paris.* 1921. Dec. 27. Vol. 47. No. 34. pp. 1414–1422.

This paper deals with interesting clinical records of two cases of indigenous amoebiasis in France.

The first case, a woman of 50 years of age, lived in Toulouse and had never been abroad. She suffered from diarrhoea, pyrexia, pain in the right hypochondrium and right shoulder joint ; she was emaciated and slightly icteric. Expectoration and vomiting of abundant brown-coloured pus took place suddenly. Dulness at the right base suggested an empyema, and by means of Potain's aspirator deeply situated thick chocolate-coloured pus was drawn off—about a litre in amount. The pleura was explored and the ninth rib resected, but no pus was found. Convalescence was retarded by cardiac troubles and oedema of the lower limbs, but on emetine injections all symptoms ceased and within a month the wound closed.

The second case also hailed from Toulouse and had never been abroad. The liver was very much enlarged and the signs similar to the first case. Thick chocolate-coloured pus was being expectorated. Exploratory puncture revealed a small abscess beneath the twelfth rib. The eleventh rib was resected in the scapular line. On emetine injection the wound cavity rapidly healed and the patient left the hospital on the 16th day after operation. The remainder of the paper consists of a résumé of the minutiae of technique and the rationale of emetine treatment.

P. H. M-B.

MIGINIAC (Gabriel). **La vomique dans les abcès amibiens du foie. Pronostic et traitement.**—*Rev. de Chirurg.* 1922. Vol. 41. No. 2. pp. 100–130.

This is a lengthy discussion summarizing the statistics published by many observers, for the most part French, on rupture of liver abscess into various organs. The text is based upon the author's two indigenous cases reviewed above. It is quite unnecessary to recite in this summary well-known statistics compiled by BERTRAND and FONTAN, ROGERS in Calcutta, GRALL, and others. The following conclusions are arrived at :—

In certain rare cases rupture of an hepatic abscess into a bronchus is to be regarded as advantageous, and therefore surgical intervention should be withheld.

In the majority of instances intrapulmonary rupture is a grievous accident, for it may produce asphyxiation, rendering emergency operation imperative ; at other times it may produce chronic pulmonary trouble, simulating tuberculosis or chronic malaria and necessitating an operation for drainage purposes.

Expectoration of liver pus may reveal a hitherto unsuspected hepatic abscess, and therefore indicate operation and drainage of that abscess. The operation must be performed according to the accepted standards, in the same manner as if no rupture had taken place. Generally this is quite sufficient to stop purulent expectoration. Emetine injections are most valuable and should never be neglected.

P. H. M-B.

FRY (A. Sargood). **Two Cases of Tropical Abscess of Liver Rupturing into the Abdomen.**—*Indian Med. Gaz.* 1922. Apr. Vol. 57. No. 4. pp. 135-137.

The first case presented many difficulties in diagnosis. There was a history of prolonged illness and signs of acute peritonitis, which it seemed probable was due to rupture of a liver abscess. At autopsy a retro-colic abscess which discharged the estimated quantity of 6 pts. of pus was found connecting with a large cavity, the size of a coconut, in the right lobe of the liver. No liver substance remained above or posteriorly to this cavity, which extended downward, so as to involve the upper half of the right kidney.

The second case, a European, presented various obscure abdominal symptoms with hiccough, and died suddenly from collapse. At autopsy an abscess of the left lobe of the liver was found to have ruptured downward, in the neighbourhood of the pylorus, into the general peritoneal cavity.

These two cases presented a remarkable difference in their respective periods of symptomatic warning. In the first some 9 months elapsed during which a diagnosis might have been made, whereas in the second the patient became aware that he was ill only some 20 days before death.

P. H. M-B.

ENNEKING (J.). **Een geval van beginnend leverabsces na een Hollandshe amoeben-dysenterie.** [Case of Commencing Liver Abscess after Amoebic Dysentery contracted in Holland.]—*Nederl. Tijdsch. v. Geneesk.* 1921. Mar. 19. Vol. 65 (1st half-year). No. 12. pp. 1579–1581.

The author emphasizes the importance of an examination for the presence of *E. histolytica* (or its cysts) in the stools of patients suffering from colitis with blood and mucus, even in persons who have never been in the tropics. A striking feature of these "autochthonous" amoebiases is the great rarity of liver abscesses, as was pointed out by CARLES of Paris in 1918. The author's own case was that of a man of 25 who in 1913 developed colitis with frequent stools (15–25 per day) containing a good deal of blood and mucus. Not until 1918 were the stools examined for *E. histolytica*, when active forms were found. Emetine treatment was apparently successful, but in 1919 there was a recurrence of the symptoms. A second course of treatment with emetine was again successful, but five months later the patient became suddenly ill with high temperature, pain in the liver region, chest and back. There was again rapid improvement on emetine treatment. [Though the author is well advised in again directing our attention to the occurrence of amoebic dysentery in persons who have never been in tropical countries, his conclusion that the case was one of commencing liver abscess is not quite convincing.]

T. Joekes.

LENOBLE (E.) & JEGAT (Y.). **Un cas de dysenterie amibienne chronique avec abcès du foie guéri par l'émétine.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. Year 38. No. 13. pp. 595–598.

In this case the amoebic origin of the dysentery and consequent hepatic abscess were amply verified by the discovery of *E. histolytica* in the stools and in the liver pus obtained by exploratory puncture. The therapeutic action of emetine was evident in the rapidity with which the patient recovered. Within 24 hours the stools had improved ; similarly the hepatic pains disappeared rapidly within the space of a very few days.

The emetine injections were given in three series, each lasting five days, 8 cgm. of emetine being injected daily.

P. H. M-B.

LAPORTE (F.) & ROQUES (E.). **Fièvre du type ondulant au cours d'une hépatite amibienne. Guérison par le chlorhydrate d'émétine.** —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. Year 38. No. 13. pp. 603–608. With 3 charts in text.

This paper records an interesting case of prolonged fever giving a temperature chart of a peculiar remittent type, resembling that of undulant fever. It was observed for four months and the patient minutely investigated before the real cause of the malady was recognized.

The patient eventually developed an enlarged and painful liver. An X-ray examination suggested definite enlargement of the right lobe ; stool examination was negative. The condition rapidly improved and the fever subsided after injections of emetine. Search through the literature failed to reveal a parallel case.

P. H. M-B.

FALZI (Ormisda). **La cura medica nell' ascesso epatico da ameba.** [Amoebic Abscess of the Liver treated medically.]—*Policlinico.* Sez. Prat. 1922. May 15. Vol. 29. No. 20. pp. 648–651. With 1 chart in text.

Whereas a short time ago amoebic abscess of the liver was regarded as curable only by surgical means, and later the employment of emetine was recommended in addition to operative measures, the author now holds that in whatever stage the condition may be (not merely in the presuppurative stages) an intensive emetine treatment may suffice and should be tried.

The patient, a male, aged 29 years, gave a history of " muco-sanguineous enterocolitis " in 1915. He passed 30–40 motions daily and was ill for a month. In 1918 he passed blood and mucus in which the *E. histolytica* was found. He was given six injections of emetine with good results. During the succeeding nine months he had vague pains over the front of the liver and in the right shoulder. In June, 1919, the diarrhoea returned and the pain increased. There was intermittent fever, enlarged and tender liver and enlarged spleen. Six months later he was pale, wasted, and a little jaundiced. There were physical signs indicative of liver abscess, confirmed by exploration. He was given on four successive days 9, 12, 3 and 9 cgm. of emetine hydrochloride. The reduction on the third day was owing to the onset of vertigo and dyspnoea. After the third injection the temperature fell to normal, and there was immediate improvement in the general condition and gradual diminution of the main clinical signs of abscess, confirmed by radioscopic examination. During the succeeding 45 days the patient put on 17 lb. in weight. It is proposed to repeat the emetine treatment periodically to prevent relapse.

H. Harold Scott.

WIDAL (F.), ABRAMI (P.) & HUTINEL (J.). **Recherches sur l'insuffisance protéopexique du foie dans l'hépatite dysentérique.**—*C.R. Acad. Sci.* 1922. Feb. 6. Vol. 174. No. 6. pp. 351–355.

Having discovered a new function of the liver, the authors propose to utilize the knowledge gained in the diagnosis of hepatic conditions. This function the authors have described as the "proteopexic function," and by its utilization it is possible to detect the least alterations in the gland. The test consists of the presence or absence of a " haemoclasic crisis " [see this *Bulletin*, Vol. 14, p. 273], estimated at frequent intervals subsequent to the ingestion of 200 gm. of milk. Frequent leucocyte counts are made and the leucocytosis is taken as an index of the completeness or otherwise of protein metabolism. This test can be utilized as a means of estimating the influence of amoebic invasion of the liver upon this function. In the first place it was necessary to determine that intestinal amoebiasis without hepatic derangement did not provoke a " haemoclasic crisis " after ingestion of milk. In a case of presuppurative hepatitis whose urine contained a trace of urobilin the ingestion of milk caused a rise in the total leucocytes of 15 to 18,000. Three other cases with actual abscess formation were also investigated, one was operated upon and 250 gm. of pus evacuated from the left lobe. The urine contained urobilin and the " haemoclasic crisis " tested on the morning of the operation indicated that the proteopexic function of the liver was undisturbed; in a second and third case the result was similar, a rise of leucocytes of 18 to 21,000 being observed.

Now it appears that, even when considerable destruction of the glandular tissue has taken place as a result of suppuration, the action of the *E. histolytica* is so local that the functions of the liver as a whole are undisturbed; the toxins of the amoeba act locally and are not widely diffused. The authors have already proved, so they claim, that, of all the substances which exercise a profound effect upon the proteopexic functions of the liver, the arsenobenzene derivatives, notably novarsenobillon, occupy the first place. In certain subjects after administration of these compounds it has been noted that in addition to the " haemoclasic crisis " urobilin appears in the urine and Hay's test becomes positive. They note with interest that in one particular case of amoebic abscess the injection of 1·65 gm. of novarsenobillon failed to provoke a haemoclasic crisis, while a much smaller amount did so in the case of a normal liver. The results obtained in liver abscess are to be contrasted with those obtained in diffuse intoxications, such as infectious jaundice and toxaemias of circulatory origin.

P. H. M-B.

ELY (L. W.), REED (A. C.) & WYCKOFF (H. A.). **[Ameba as Cause of Second Great Type of Chronic Arthritis.]**—*California State Jl. Med.* San Francisco. 1922. Feb. Vol. 20. No. 2. p. 59. [Summarized in *Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. p. 682.]

A relationship of the *E. histolytica* to osteoarthritis is actually suggested in this paper. It is *claimed* that in paraffin sections of the bone in the region of necrotic areas numbers of *E. histolytica* could be demonstrated in the vicinity of the bone capillaries.

P. H. M-B.

KOFOID (Charles A.) & SWEZY (Olive). **Amebiasis of the Bones.**—*Jl. Amer. Med. Assoc.* 1922. May 27. Vol. 78. No. 21. pp. 1602–1604. With 7 text figs.

" Amebas in the lesions of Ely's non-bacterial or second type of arthritis " were identified by the authors of this paper. Many instances of the coincidence of amebiasis with arthritis have come to their notice during the last four years.

In one case, in which the tissues were preserved in formaldehyde, they found " ameboid cells " which they interpret as " *Endameba dysenteriae.*" These are said to occur in the head of the excised femur in the immediate neighbourhood of the necrotic areas near the eburnated joint surface. They have vacuolated protoplasm and a few are filled with red blood corpuscles or what appear to be their remnants ; many have pseudopodia. All have a vesicular, spherical nucleus said to be characteristic of *E. dysenteriae.*

The disappearance of the nuclear membrane during mitosis and the formation between the daughter centrosomes, at the poles of the spindle, of a type of connexion known as the central spindle, or centrodesmose, are quoted as features which distinguish these "amebas" from surrounding cells. By " assiduously searching " sections of the excised femur several binucleate " amebas " were discovered in the territory in which cells interpreted as " amebas " were originally found and the nuclear spindle is contrasted with a dividing epitheloid cell from a gland of Hodgkin's disease.

In the " amebas " of the intestinal tract the number of chromosomes is eight, in *Entamoeba coli* it is six, while the number of somatic chromosomes in man is either 24 or 48. On the basis of the type of mitosis and number of chromosomes in the cell, the amoeboid organisms in the bone marrow are " amebas " rather than amoeboid human cells. The question is considered whether the " ameba " of the bone is that of the bowel or of the teeth and tonsils (*E. gingivalis*), but they incline to the view that it more closely resembles *E. dysenteriae.*

[Considerable hesitation will be felt in accepting the interpretation or conclusions of these workers without more direct evidence than that based upon mitotic figures.]

P. H. M-B.

KOFOID (Charles A.), BOYERS (Luther M.) & SWEZY (Olive). **Occurrence of *Endamœba dysenteriae* in the Lesions of Hodgkin's Disease.** —*Jl. Amer. Med. Assoc.* 1922. May 27. Vol. 78. No. 21. pp. 1604–1607. With 7 text figs.

Sections of glands of Hodgkin's disease, in some cases associated with active intestinal amoebiasis and the passage of cysts of *E. dysenteriae* in the faeces, demonstrated to the satisfaction of these workers certain amoeboid cells closely resembling this pathogenic protozoon. The discovery of the characteristic " ameba " mitosis described above encouraged the authors to search for " amebas " in the lymphatic glands of Hodgkin's disease. Prolonged and assiduous search revealed cells suspiciously like amoebae, sometimes typical, sometimes degenerating. The remaining arguments in favour of their claim have already been cited in the previous article. [Neither the argument nor the figures of individual " amebas " in the affected glands are at all convincing.]

P. H. M-B.

IZAR (Guido). **Forme rare di amebiasi latente e cronica. La sindrome pseudo-malarica. La sindrome pseudo-tifica.** [Rare Forms of Latent and Chronic Amoebiasis. Pseudo-malaric and Pseudo-typhoid Syndromes.]—*Policlinico.* Sez. Prat. 1921. July 11. Vol. 28. No. 28. pp. 939–942.

The pseudo-malarial syndrome described by the writer is characterized by anaemia and intermittent fever. In a region where malaria is very common the diagnosis is not easy. In a case described it was arrived at by the absence of splenic enlargement, the failure of quinine treatment and the negative blood examination. In a second case a suspicious diarrhoea led to an examination of faeces and the discovery of *Entamoeba histolytica.*

The pseudo-typhoid syndrome is characterized by severe intestinal symptoms and persistent high temperature with cerebral symptoms. The first case reported showed the following clinical picture : diarrhoea, furred tongue, foetid breath, temperature remaining between 102° and 103° for a fortnight with severe headache, typhoid state and delirium. During convalescence the serum was tested and failed to agglutinate either *B. typhosus* or either of the paratyphoid groups, or the " *Micrococcus Brucei.*" Entamoebae were subsequently found in the stools and the patient was successfully treated with emetine.

J. Rosslyn Earp.

SANFILIPPO (Emanuele). **Appendiciti e pseudo-appendiciti di origine amebica.**—*Policlinico.* Sez. Prat. 1921. Dec. 19. Vol. 28. No. 51. pp. 1715–1719.

Attention has often been drawn to the occurrence of appendicitis as a complication of amoebic dysentery. The writer, who also cites cases in support of the thesis that amoebic appendicitis is more common than is generally supposed, goes on to describe two more in which the symptoms of appendicitis were present without any lesion of the appendix. There are thus to be distinguished (*a*) acute appendicitis with perforation occurring in acute amoebic dysentery, the condition being usually first discovered at autopsy ; (*b*) localized inflammation of the appendix in the course of chronic dysentery with a symptom complex characteristic of relapsing chronic appendicitis; and (*c*) a pseudo-appendicitis in which the appendix is found to be healthy in operation or at necropsy. The symptoms in this case would appear to be due to reflexes from an ulcerated caecum.

J. Rosslyn Earp.

NOGUE. **Un cas de cystite amibienne.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. May. Vol. 1. No. 1. pp. 22–24.

A native of Senegal, 22 years of age, had suffered for nine years from intermittent haematuria, due probably to vesical bilharziasis. A year before consultation he had suffered from dysentery. Shortly afterwards a painful cystitis supervened, for which he was examined, and the urine was submitted to LÉGER, who reported the absence of ova of *S. **haematobium***, but, on the other hand, numerous active entamoebae with granular endoplasm and ingested erythrocytes of a diameter of 20μ. Improvement commenced directly emetine treatment was instituted:—2-6 cgm. were given at two-day intervals by the intravenous route. The urine became normal and the amoebae disappeared. A second course of emetine treatment was instituted a month later and no relapse has occurred. The author thinks the pathogenic rôle of the amoeba in this case incontestable.

P. H. M-B.

JACKSON (Leila). **An Ameba-like Organism in the Kidneys of a Child.** —*Jl. Infect. Dis.* 1922. June. Vol. 30. No. 6. pp. 636–642. With 2 plates.

A child of 15 months died suddenly in convulsions. At autopsy broncho-pneumonia, enlarged mesenteric glands, congestion and fatty changes in the liver, and parenchymatous nephritis were found. In sections of the kidneys, especially in the secreting tubules, round eosin-staining bodies arrested attention. The surrounding tissue reaction was mild; stained with polychrome methylene blue the bodies colour a peculiar blue, which readily distinguishes them from the deep purple kidney cells.

The forms assumed by this "parasite" varied from 10–18μ in diameter. Certain forms appeared to be undergoing schizogonic changes and nuclei in the various stages of mitosis were numerous. Encysted forms were also encountered. These bodies are compared to similar appearances described by other observers in the organs of a syphilitic foetus.

[Two plates illustrate this article; the first is composed of semi-diagrammatic figures of the supposed organism, while in the second microphotographs of sections of kidney tubules are represented; in neither case do these bodies at all suggest parasites.]

P. H. M-B.

WARTHIN (Aldred Scott). **The Occurrence of** *Entamoeba histolytica* **with Tissue Lesions in the Testis and Epididymis in Chronic Dysentery.**—*Jl. Infect. Dis.* 1922. June. Vol. 30. No. 6. pp. 559–568. With 7 text figs.

This case is a curious one. The patient had suffered a great deal from dysentery in China; he died subsequent to an operation for supposed hepatic abscess. At autopsy the following condition was reported: unresolved croupous pneumonia with early abscess formation and organization; purulent bronchitis; early atrophic cirrhosis;

WARTHIN, A. S.]

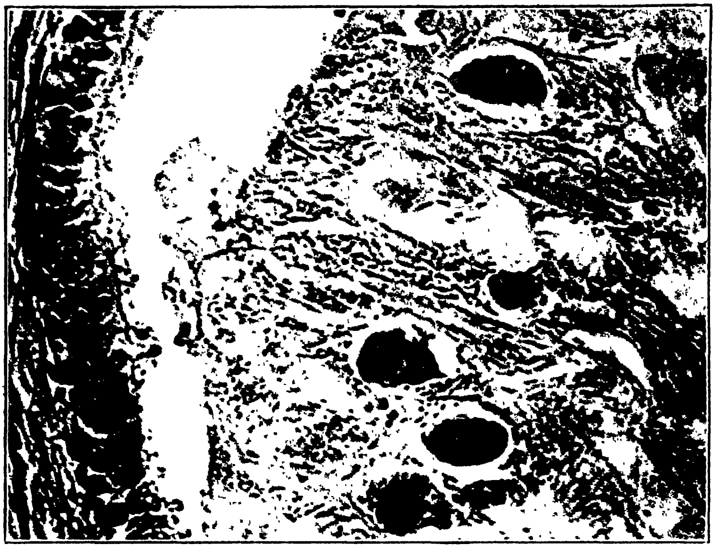

FIG. 1. Portion of clot containing *Entamoeba histolytica*, from tail of epididymis.

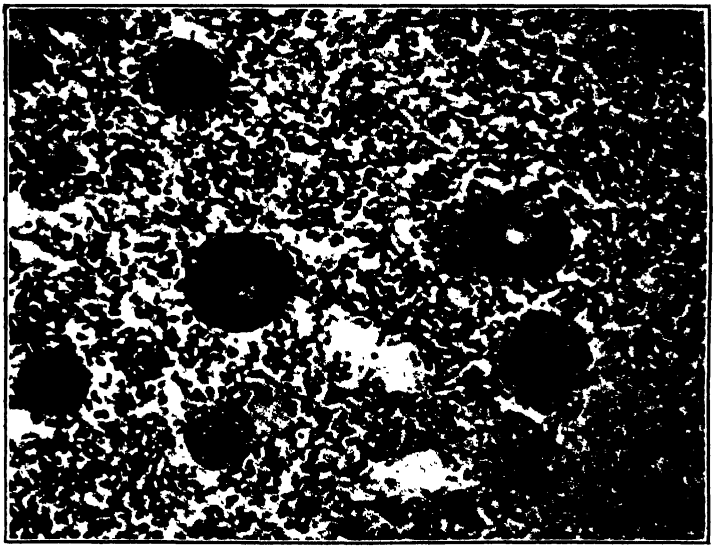

FIG. 2. *Entamoeba histolytica* in mass of sperm from epididymis. The characteristics of the nucleus are well shown, as is also the phagocytosis of spermatozoa by them.

[Reproduced by permission from the *Journal of Infectious Diseases.*]

chronic passive congestion of spleen with fibrosis; healed chronic amoebic dysentery; metastasis of *Entamoeba histolytica* to epididymes and testes with local lesions; latent syphilis. The epididymis was dilated; spermatocele on left; left testis large, on section a fibroid patch; right testis smaller and firmer, stroma increased; prostate slightly enlarged. On microscopical examination of the epididymes both, particularly the left, showed marked dilatation of the ducts; these were filled in part with masses of spermatozoa through which great numbers of amoebae were scattered. In the sperm-filled ducts there was little fibrin and the amoebae were rounder than in the fibrin clots in the vasa. No blood-cells were found in the amoebae in the semen, but there was marked phagocytosis of spermatozoa by the amoebae. On the left side a number of large dilated ducts at the head of the epididymis contained a heavy albuminous, almost hyaline, precipitate without spermatozoa or amoebae. About the ducts the connective tissue was thickened and the blood-vessels sclerotic. The ductuli efferentes contained fibrin clots in which amoebae were present; the adult types of amoebae showed marked phagocytosis of red cells.

The amoebae found in the testes corresponded in every way to those previously found in the stools of the patient when first seen; in the dilated duct of the epididymis many degenerating forms, as well as precystic and cystic forms, were present. In some cases spermatozoa had been ingested.

The case presents, therefore, the unique occurrence of the metastasis of *Entamoeba histolytica* to the epididymis with definite, though slight, local lesions in these organs in a patient affected for many years with amoebic dysentery.

[The microphotos which illustrate the article certainly suggest that the organism depicted is in fact *Entamoeba histolytica* (see figs., p. 687).]

P. H. M-B.

Le Noir & de Fossey (Mathieu). **Épreuve biliaire pour le diagnostic et le traitement de la dysenterie amibienne.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 6. 38th Year. 3rd Ser. No. 23. pp. 1024–1028.

The diagnosis of intestinal amoebiasis is often in doubt on account of the well-recognized difficulty of finding entamoebae or their cysts, so that it is necessary to examine stools microscopically on many occasions in order to obtain the necessary evidence. The authors have conceived the idea that by rendering intestinal conditions favourable to entamoebae the search for them in the stools will be rendered less difficult, and treatment more efficacious; in other words, he aims at provoking an artificial relapse. Bile extract is given in the form of desiccated powder in keratinized capsules, commencing with nine capsules daily, each containing 0·2 gm., three after each meal. During this period the patient maintains the customary regime. When the stools become fluid the organisms appear and cysts are passed in numbers, and the newly produced parasites are, as suggested by Ravaut, more susceptible to the action of emetine bismuth iodide.

The first series of 11 cases were treated by this method, together with emetine injections, totalling 0·4 cgm. in all. Six apparently were cured, but the remaining five were doubtfully improved, the standard of "cure" being assessed upon failure to find cysts following diarrhoea provoked by bile cachets.

In the second series 9 cases were first subjected to an intravenous injection of 0·3 gm. neosalvarsan. The following day they received three soup-spoonfuls of Ravaut's paste, *i.e.* :—

Powdered charcoal	100 gm.
Powdered subnitrate of bismuth ..	
Syrup	
Glycerin	
Powdered ipecacuanha..	4 gm.

The treatment is continued for 12 days; alternately Ravaut's as above, and 0·1 gm. neosalvarsan in two doses of 0·05 gm. each. The results were apparently very favourable.

The third series of 2 cases were given emetine bismuth iodide, but on account of the severity of the reaction treatment had in each instance to be abandoned.

The fourth series consisted of 2 cases with severe rectal ulceration; they were given Ravaut's paste by the mouth and rectal injections of mucilage, bismuth and neosalvarsan, with rapid improvement of the symptoms.

P. H. M-B.

GAUDUCHEAU (A.). **Remarques sur les amibes cultivables parasites de l'intestin de l'homme.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 229–237. With 2 text figs.

Gauducheau combats the statement of DOBELL that the amoebae cultured from human faeces are free-living species and incapable of living in the human intestine [this *Bulletin*, Vol. 1, pp. 181–182] as not consistent with fact. In 1907 he described as *Entamoeba phagocytoïdes* a species he had observed in Cochin-China, and he here returns to the subject.

In 1916 a cholera epidemic broke out in Cochin-China amongst the Annamite Labour Corps, necessitating systematic stool examinations on a large scale. The ectoplasm of this amoeba—better called *Endolimax phagocytoïdes*—which frequently occurred in the stools, is quite characteristic; it is hyaline and forms a border to the organism, quite distinct from that of other recognized species. The nucleus is also quite distinctive, having a large spherical karyosome, generally centrally placed, and a well-developed nuclear membrane. By the methods of MOUTON, LESAGE, MUSGRAVE and CLEGG the organism can be cultured in close association with bacteria; for instance, organisms of the *coli* or *pasteurella* groups symbiose well, to a lesser extent do *staphylococci*, while gram-positive spore-bearing bacilli of the *subtilis* and *mesentericus* groups kill the amoebae out entirely. When red blood corpuscles such as those of a monkey are added to the medium, they are ingested with avidity; thus five or six erythrocytes have been seen within a single amoeba. Morphologically, at any rate, this amoeba greatly resembles certain small amoebae occurring in water in Indo-China; on the whole these latter are more easily cultivated. In spite of the similarity in structure, Gauducheau thinks it premature to assume that they are identical with the free-living forms. No cysts have as yet been observed in cultures.

P. H. M-B.

LEONE (Raffaele). **Contributo alla diagnosi micro-biologica della dissenteria amebica.**—*Riforma Med.* 1921. Feb. 5. Vol. 37. No. 6. pp. 129–130.

In testing a large number of stools daily there is not time to use the finer methods of distinguishing *Entamoeba histolytica.* The use of methylene blue as a differential dye has not always been satisfactory. Lately the writer has made successful use of the method of CUTLER & WILLIAMSON [this *Bulletin,* Vol. 14, p. 250], but finds that their solution of neutral red (1 in 1,000) is too strong and prefers a solution of half the strength [CUTLER & WILLIAMSON's solution was 1 in 10,000]. This he makes daily in small quantities, as after 24 hours the colour is liable to precipitate. The writer has tried various other red dyes (Magdala red, Magenta red, Congo red, Sudan III, etc.), but concludes that neutral red solution 1 in 2,000 of 0·75 salt solution is the most satisfactory.

J. Rosslyn Earp.

ALLAN (William). **The Effect of Emetinized Blood and Serum from Man and Cat on Pathogenic Entamoebae in Stools.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 195–198.

Emetine is not particularly toxic when applied to pathogenic amoebae within the time limit of one to two hours; according to DALE & DOBELL it acts upon the host rather than upon the parasite. Blood and emetine mixtures were made by adding to whole blood an equal amount of a 4 per cent. sodium citrate solution containing emetine hydrochloride 1 : 500. To the serums of cat and human blood was added an equal amount of a 1 : 200 emetine solution. Equal parts of each of these mixtures and the dysenteric stool were stirred vigorously on slides and observed under cover glasses for approximately an hour; dilutions were made with distilled water and after two hours the control amoebae were still active. From information summarized in tabular form we gather that human blood and serum mixed with emetine had no more effect than cat blood and serum similarly mixed. The effect of blood withdrawn from man and cat two or three hours after therapeutic doses of emetine was next tested. The observations showed that citrated blood of man and cat so withdrawn had no effect on entamoebae in stools in dilutions weaker than 1:8 when observations were conducted over the space of one hour.

P. H. M-B.

BROWN (H. C.). **Observations on the Amoebicidal Action of Conessine.**—*Brit. Med. Jl.* 1922. June 24. pp. 993–994.

Conessine, an alkaloid having the formula $C_{12}H_{20}N$, has been isolated from several members of the natural order, Apocynaceae. It has been obtained from *Holarrhenica antidysenterica* in India and from *Holarrhenica congolensis* from the Belgian Congo. Failing to obtain suitable material containing *Entamoeba histolytica* in sufficient numbers, experiments were undertaken with cultures of pond amoebae. It is known that infusions of the seeds of these plants have long been used with success in the treatment of chronic dysentery. When injected subcutaneously in medicinal doses conessine produces locally an area of necrosis; on the other hand, it can be administered by the mouth in suitable doses without producing untoward symptoms. Experiments upon mice prove it to be 50 per cent. less toxic than emetine. A distinct diminution of the amoebicidal action of emetine and conessine takes place when brought into contact with intestinal mucus. When planted on media containing a concentration of 1 in 1,000,000 conessine sulphate the growth of freshwater amoebae is inhibited.

P. H. M-B.

KILPATRICK (G. C.). **Prevalence of Entamebic Disease: Diagnosis and Treatment.**—*Southern Med. Jl.* 1922. Apr. Vol. 15. No. 4. pp. 275–278. [Discussion, pp. 278–280.]

This paper contains an exposition of somewhat highly-coloured views upon the possibility of spread of amoebiasis in the United States. It is justifiable, he thinks, to assess the incidence among 2,000,000 overseas men at 20 per cent. The figure amongst the home-staying population is assessed at 4 per cent. " It is easy to see what a colossal epidemic of amebiasis occurred within the short period of about one year." Emetine hydrochloride is considered a very dangerous drug. Its chief value in treatment is in direct proportion to the acuteness of the disease.

P. H. M-B.

BRUGEAS. **Sur un début de dysenterie à forme appendiculaire.**—*Arch. Méd. et Pharm. Nav.* 1921. May–June. Vol. 111. No. 3. pp. 256–259.

This paper embodies an account of a case of amoebiasis particularly affecting the caecum and causing a clinical condition resembling appendicitis.

P. H. M-B.

BACILLARY DYSENTERY.

RIGANTI (Humberto). **Estudios epidemiológicos sobre la disenteria bacilar en la República Argentina (Segunda communicación).** [Epidemiological Studies of Bacillary Dysentery in the Argentine.] —*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp. 281–288.

In 1918 an epidemic of dysentery occurred in Catamarca and La Rioja attacking both infants and adults. From 42 patients bacteria were isolated, but in none of these cases were the usual organisms found, namely Shiga-Kruse, Flexner, or Hiss bacilli. The author quotes instances in which atypical dysenteries occurred elsewhere, that is, cases in which none of the above-mentioned organisms were isolated, notably MORGAN's investigations in 1905 to 1908, LEWIS, Ross and others in 1910 and 1911, and TRIBONDEAU and FICHET in patients from the Dardenelles in 1916. He also mentions the statement of BURNET and LEGRAUX in their paper entitled " Le Diagnostic bacteriologique de la Dysenterie bacilaire " [this *Bulletin*, Vol. 14, p. 324], in which the conclusion is given that the only organisms which should be regarded as causative of bacillary dysentery are the bacilli of Shiga-Kruse, Hiss, Strong, and Flexner.

Among the 42 cases studied by the author, however, in 24 instances he isolated Morgan's bacillus, in 15 that of Strong, and in the remaining 3 the " Para-Flexner " bacillus. The last-named differs from the Flexner organism in producing acid in sorbite, dulcite and Petruschky's milk media. Toxins were obtained from these bacilli [the method of preparation is not stated], which caused the death of rabbits of

600–700 gm. weight in doses of 1 cc. injected intravenously, and the author concludes that the organisms isolated were causative of the epidemic studied, though he gives no reasons other than the fact that they were isolated from the faeces while the usual organisms and also the *Entamoeba histolytica* were not discovered.

H. Harold Scott.

MSCIWOJ (Lemeran). **[La bactériologie, la pathogénèse et la clinique de la dysenterie.]**—*Nouvelles Méd.* Poznan. 1921. Vol. 33. Nos. 1–5. 1st Pt. pp. 14–21. [Summarized in *Bull. Inst. Pasteur.* 1922. Mar. 15. Vol. 20. No. 5. pp. 195–197.]

These researches were undertaken on 40 recruits of the Polish army suffering from bacillary dysentery. The diagnosis was established by two methods. By culture of the faeces four positive isolations of Shiga's bacillus were obtained. The serum reactions were tested in 33 cases and a positive result obtained with known types of dysentery bacilli, in 19 of which it was the Shiga-Kruse bacillus; in the latter series agglutination occurred with Flexner-Y and Strong. The negative results are explained by the author on the assumption that no antibody formation takes place in the serums of certain cases, of which two were fatal. The suggestion is made that the epidemic in Poland was introduced from the East. Attempts to isolate the organism from the blood were not attended with success. The epidemic in Poland in 1920 was, on the whole, mild in character, the mortality rate being assessed at 7 per cent. The following hypothesis on the pathology of dysentery is set forth:—

It is suggested that the micro-organisms of dysentery introduced into the human body, by direct contact or ingestion with food, penetrate the upper part of the intestine, where they remain for a certain time, causing an alteration of the mucosa and thereby gaining entrance to the blood; in the blood-stream they are conducted to the large intestine, where they produce the well-known lesions.

The initial prevalence of the organisms in the upper portion of the digestive tract will explain the clinical phenomena of dyspepsia and other vague digestive troubles in the prodromal stage of the illness with the development of rigors and bloodstained stools. Pyrexia would indicate the entrance of the bacilli into the blood.

P. H. M-B.

SPENCE (Ralph C.). **Infectious Diarrhea in Young Children.**—*Southern Med. Jl.* 1922. Mar. Vol. 15. No. 3. pp. 189–193.

Acute diarrhoea in infants and young children in which the onset is sudden with fever and prostration, and the stools contain blood and mucus for several days, is certainly due to one of the dysentery bacilli; while, on the other hand, those cases without bloodstained stools are probably not due to these organisms. The title of the present paper should then read "Bacillary Dysentery in Young Children." In view of the difficulties attending the isolation of dysentery bacilli from the faeces, the much more efficacious method has been evolved of making cultures from the rectum by means of the proctoscope. In 1920, 60 infants and young children with diarrhoea were thus examined, with the result that every case having the clinical picture of bacillary dysentery gave a positive culture; these were 9 in number, 7 Flexner and 2 Shiga.

P. H. M-B.

MITA (Koh). **Ueber die ruhrartigen Krankheiten der Kinder, insbesondere ueber ihre Erreger.** [Dysentery-like Diseases of Children and their Causes.]—*Mitt. a. d. Med. Fak. d. Kais. Kyushu-Univ.* Fukuoka, Japan. 1921. Vol. 6. No. 1. pp. 111–127.

This paper, based upon an investigation of dysentery in children in Japan, runs on familiar lines. The author is of the opinion that true dysentery or dysentery-like symptoms are produced by various types of bacilli ; no fewer than one-third of the cases of dysentery are caused by organisms which do not conform to the true type, and these are the paradysentery organisms isolated and recognized by Mita for the first time. The paradysentery are small rod-like non-motile bacilli, which ferment glucose without gas formation ; milk is clotted after 2–3 weeks culture, and in old subcultures still earlier ; they form regular rounded colonies, which are characteristic ; they can be classified from their reactions in carbohydrates into two types ; and they are infectious and pathogenic and produce diphtheritic inflammation of the bowel wall in man. Dysentery-like symptoms can be produced by paratyphoid and allied organisms. One type, closely related to the paratyphoid group and discovered by the author, is slightly motile and ferments mannite and glucose with gas formation. It is pathogenic to man and is known as paratyphoid X.

P. H. M-B.

KLING (D.). **Chronische Bazillenruhr und Colitis gravis.**—*Wien. Klin. Woch.* 1922. Mar. 16 & 23. Vol. 35. Nos. 11 & 12. pp. 239–243 ; 271–274.

Chronic haemorrhagic, and suppurative colitis were formerly regarded as distinct entities, but since the war these conditions are recognized as forms of chronic bacillary dysentery. ALBU, in 1915, concluded that ulcerative colitis and chronic bacillary dysentery were one and the same disease, the absence of a specific agglutination reaction against dysentery bacilli being considered of little import.

Eleven cases are cited by the author in which chronic bacillary dysentery has been observed to merge into chronic ulcerative colitis. Clinically these cases resemble grave forms of ulcerative colitis, and rectoscopic examinations bear this out. The stools were mucoid, with blood and pus ; anaemia and cachexia were associated with wart-like outgrowths and a polypoid condition of the mucosa. One patient died after eight months sickness. This condition, in which acute inflammation of the mucosa with formation of polypi and granulation tissue takes place, is well termed " colitis gravis." From hitherto published statistics middle-aged persons appear to be the most liable, children and those over 50 being seldom affected.

The etiology of submucous abscesses is not clear ; they apparently begin as epithelial downgrowths, with formation of cysts, which subsequently become infected and purulent. Six cases of " colitis gravis " are described in which the evidence of previous bacillary dysentery, either from stool isolation or from serological reactions, could be taken as fairly conclusive. The author considers that some factor is at work preventing the complete healing of the mucosa in the acute stage ; that such causes as unsatisfactory treatment, chronic bad health, anaemia and intercurrent complications are at work. The various methods of treatment hitherto commonly employed are summarized; none is regarded as satisfactory. Attempts at improving the general condition by dietetic measures have given the best results.

P. H. M-B.

TSCHERNING. **Cholecystitis dysenterica chronica.**—*Muench. Med. Woch.* 1922. July 21. Vol. 69. No. 29. p. 1085.

In this particular case the patient contracted bacillary dysentery in Macedonia in 1918. This was followed by dyspeptic symptoms and pain referred to the gall-bladder. At operation a chronically inflamed gall-bladder was discovered, from which dysentery bacilli of the Y type were obtained. The author therefore considers that cholecystitis may be quite a common complication of bacillary dysentery, and that the infection of the biliary tract possibly gives rise, as in enteric, to the carrier state. It is possible that in the future the duodenal sound will be introduced as a means of procuring material for culture in doubtful cases.

P. H. M-B.

MATHIAS (E.) & HAUKE (Hugo). **Zur Infektiosität chronischer Ruhrfälle.** [Infectiousness of Chronic Dysentery Cases.]—*Zentralbl. f. Chirurg.* Leipzig. 1921. Sept. 3. Vol. 48. No. 35. pp. 1270–1271.

There is little original in this paper, which consists of an account of a fatal termination of a case of appendicectomy. At the post-mortem, signs of early dysenteric lesions were found in the mucosa of the rectum. It is conjectured that the infection was contracted from a case of chronic bacillary dysentery in the same ward. The authors dilate upon the lessons to be derived from this experience and suggest that chronic dysenterics should be regarded as infectious cases and nursed in separate wards.

P. H. M-B.

GOYON (Am.) & DEBRAY (Jacques). **Polynévrite consécutive à une dysenterie bacillaire à Shiga.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 129–131.

This is an account of a polyneuritis supervening in the course of a dysentery of bacillary origin—in the author's opinion, a Shiga infection. The patient, residing in a village in which bacillary dysentery was at the moment epidemic, had suffered from several dysenteric relapses and was treated with antiserum. The polyneuritis supervened suddenly, when he was apparently convalescent; his serum agglutinated Shiga's bacillus in a dilution of 1 : 20. The neuritis affected him in the following manner: a flaccid paraplegia of the inferior extremities with abolition of reflexes, muscular hyperaesthesia and a negative Babinski response. The upper extremities were completely paralysed and the interossei wasted, as in the Aran-Duchenne type of muscular atrophy. The cerebrospinal fluid was normal and recovery was complete.

P. H. M-B.

YOUNG (H. M.). **Ulcerative Colitis due to** *Bacillus dysenteriae*, **simulating Pernicious Anaemia.**—*Canadian Med. Assoc. Jl.* 1922. May. Vol. 12. No. 5. pp. 332–333.

A record of a case of profound secondary anaemia in which the loss of blood preceded intestinal symptoms. Liver and spleen were both enlarged, there was oedema of both legs and a small sausage-shaped mass was palpable to the left of the umbilicus. Red blood corpuscles numbered a million, with haemoglobin 10 per cent. (Daré) ! Repeated blood transfusions resulted in a noticeable improvement in the patient. Proctoscopic examination of the rectum and sigmoid revealed haemorrhagic ulceration and subsequent stool culture yielded *B. dysenteriae* Flexner. Great improvement followed ileostomy with removal of the appendix and subsequent daily colonic irrigations of normal saline and silver nitrate 1 · 10,000.

P. H. M-B.

DAVISON (Wilburt C.). **The Bacteriolysant Therapy of Bacillary Dysentery in Children. Therapeutic Application of Bacteriolysants ; d'Herelle's Phenomenon.**—*Amer. Jl. of Dis. of Children.* 1922. June. Vol. 23. No. 6. pp. 531–534.

It has been demonstrated by D'HERELLE and others that faeces taken from a dysenteric convalescent contain an extract which, when added to young cultures of dysentery bacilli, will kill and dissolve the organisms. The names bacteriophage, bacteriolysant and lytic agent have been given to these filtrates. When injected intravenously or subcutaneously into rabbits and other animals they produce no harmful effects, but the animals develop antibodies for the organisms. KABESHIMA and others have demonstrated that injections of an anti-dysentery bacteriophage into rabbits infected with dysentery bacilli are harmless, and this has been the author's experience.

Bacteriolytic filtrates against one or more strains of Flexner bacilli were obtained and administered to 12 infants, aged from 2 months to 4 years, suffering from bacillary dysentery, from 10 of which cases Flexner bacilli were isolated. The dose varied from 5 to 198 cc. and was given from one to ten times, either by mouth or per rectum, the total amounts varying from 5 to 1,381 cc. Nine were severe cases and 7 died (mortality 78 per cent.). The conclusion is reached that bacteriolysant therapy does not influence the course of the disease, and that this failure may possibly be explained on the ground that treatment was commenced too late.

P. H. M-B.

LORNIE (P.) & JONES (D. Ellis). **The Treatment of Asylum Dysentery by Means of Antidysentery Serum.**—*Brit. Med. Jl.* 1922. June 17. pp. 949–950.

The treatment of asylum dysentery by means of antidysenteric serum is an important subject, for during the second half-year 1921 the number of persons in mental hospitals attacked by dysentery was 728, of whom 126 died. Serum used was supplied by Messrs. Burroughs Wellcome and Co., and by Messrs. Evans, Lescher and Webb.

The injection was made subcutaneously in doses of 20–45 cc. The smaller amount was repeated daily, even up to four consecutive days. In 10 cases recorded, the improvement of the patient was instant and remarkable. The results obtained are more satisfactory than any previous records. Apart from the rapid improvement of the stools, the rapid fall in the temperature and immediate and marked physical improvement of the patient have been the main features.

P. H. M-B.

LANTIN (Pedro T.). **Various Methods of Serum Application in Bacillary Dysentery.**—*Philippine Jl. Sci.* 1921. Dec. Vol. 19. No. 6. pp. 629–641. With 6 text figs.

During 1918 there were admitted to the medical wards of the Philippine General Hospital 164 cases of bacillary dysentery, chiefly in adults from 20 to 30 years of age. The disease occurs throughout the year, especially in the rainy season (July, August and September), when flies are abundant. Out of 66 cases in which cultures were made from stools, 30 were Shiga, 7 Flexner, and undetermined types 14.

Serum, being difficult to obtain, was used only in the most serious cases. The mortality rate in the series was 8·53 per cent. Of 105 receiving antidysenteric serum 12 died, a mortality rate of 11·42 per cent.

The methods of serum administration were (1) per rectum alone; (2) intramuscular injection and per rectum (enema); (3) intramuscular injection alone; (4) intramuscular and intravenous injection; (5) intravenous injection alone.

The classification into clinical types is difficult and should be based, it is suggested, upon the general condition of the patient, rather than upon the number and nature of the evacuations.

Serum per rectum is introduced through a funnel and long rubber tube, the patient being in the knee-elbow position. A preliminary cleansing enema of sodium bicarbonate (1·5 per cent.) is followed by a sedative enema of 60–100 cc. of starch solution with 15 drops of laudanum. The high serum enema of 30–80 cc. is given half an hour later. In this manner 9 cases were treated with success.

The combined method—serum per rectum plus intramuscular injection—was applied in 10 severe cases; there were 2 deaths.

The third series, all classified as of severe type, comprised 64 patients. There were 5 deaths. The injection of 20–60 cc. was made daily into the buttocks, as long as considered necessary. Later 20 cc. was injected every four hours for the first three days after admission and 20 cc. twice daily thereafter.

In the fourth series intramuscular and intravenous injections were combined in 13 cases, all very severe. Five cases died.

In the fifth series intravenous injection was tried on nine cases, all of which recovered. The dosage employed was 10–20 cc. daily, 1 cc. being injected four to six hours previously, so as to avoid anaphylaxis. The reaction following intravenous injection was mild; usually a chilly sensation lasting from 30 to 60 minutes ensued, accompanied by a rise in temperature, with slight acceleration of pulse and respiration.

In an acute disease like bacillary dysentery early application of specific therapy is imperative on account of the very definite pathological processes going on in the large intestine and because of the severe toxaemia. Suspicious cases should not await the results of the bacteriological examination, especially children. The serum is both antitoxic and bactericidal; its administration per rectum should mean the local neutralization of the toxin. Clinical observation supports this view—24 hours after the injection of serum per rectum the patient feels much relieved. There are, of course, drawbacks to this method ; the serum may not reach the whole area of tissue involved, or may fail to neutralize the toxins already absorbed. It succeeds best when the patient is able to retain the serum for some time ; in specific cases this may be from two to four hours.

In the administration of serum by intramuscular injection the main purpose is to neutralize the toxin as much as possible by the specific antibodies. The results are gratifying. In the author's opinion the combined method of intramuscular and rectal injections in acute cases offers the best chance of success. The action of serum injected intravenously is similar to that of intramuscular serum, but the effects are more rapid. Its special indication is in severe cases. In the series of 105 cases treated with serum, no symptoms referable to serum sickness were observed, though later it is said that there developed alarming symptoms, resulting in one case in death and, in a second, in urticarial and joint pains appearing on the eighth day.

P. H. M-B.

DE JONG (D. A.). *Bacterium dysenteriae* **typus Flexner en** *Bacterium dysenteriae* **typus Leiden.**—*Tijdschr. v. Vergelijkende Geneesk., enz.* 1922. Apr. 1. Vol. 8. Nos. 2 & 3. pp. 101–106. [English summary, p. 107.]

Dysentery in Leyden in 1918 was caused by two types of Flexner bacilli, differing very slightly from each other. Indol formation was absent and milk slowly coagulated in one, in which characters it resembled a similar strain described by BAERTHLEIN and D'HÉRELLE. Two new cases occurred in 1921 ; from one the pure Flexner type was isolated, from the other the organism described above.

P. H. M-B.

PATTERSON (S. W.) & WILLIAMS (F. E.). **The Sonne Dysentery Bacillus in Australia.**—*Jl. Path. & Bact.* 1922. July. Vol. 25. No. 3. pp. 393–394.

From a fatal case of gastro-enteritis a Flexner-like organism was isolated in Melbourne ; it was noted that the colonies were larger, and after 24 hours culture they were more opaque with thicker centres and spreading margin. From two cases of acute colitis in adults and from three of acute diarrhoea in children an almost pure culture of the same organism was obtained. The bacilli were agglutinated by only one monovalent serum (X Hughes). The organism corresponds with the dysentery bacillus of SONNE, a bacillus also investigated by THJÖTTA. Intraperitoneal injections of young cultures produced intestinal ulceration in those rabbits which survived long enough [see this *Bulletin*, Vol. 7, p. 223].

P. H. M-B.

KORTHOF (G.). **Some Notes on the Bacteriology of Dysentery.**—Reprinted from the *Transactions of the 4th Congress of the Far Eastern Assoc. of Trop. Med.* Weltevreden : Javasche Boekhandel en Drukkerij Rijswijk. 14 pp.

This paper, for the most part, consists of a résumé of recent literature on bacillary dysentery, all of which has, from time to time, been reviewed in the pages of this *Bulletin*. The author suggests a method of plating out dysenteric exudate with a view of isolating dysentery bacilli to the best advantage. One cc. of blood and mucus is mingled in a tube with 9 cc. of aqua destillata, and of this 1 cc. is put in a second tube of 9 cc. also of aqua destillata until dilutions of 1 : 1,000 and 1 : 10,000 result. From the fluid of both these dilutions two or three drops are taken and spread upon the entire surface of a plate, when very regularly distributed colonies result.

P. H. M-B.

COPPINGER (F. R.) & ROBERTSON (R. C.). **Preliminary Experiments with a View to the Preparation of a Non-Toxic Dysentery Vaccine.** —*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 243–250.

The experiments recorded refer only to Shiga's bacillus. Attempts to dissolve suspensions of this organism with decinormal and normal sodium hydrate were unsuccessful, but when neutralized with normal hydrochloric acid the suspension became opaque and could be subsequently precipitated with excess of absolute alcohol. The precipitate when washed and dried formed a white powder. Portions of the powder, equivalent in weight to 20 million, 200 million and 400 million unaltered Shiga bacilli, were injected intravenously into rabbits without the supervention of toxic symptoms. After a dosage equivalent to 200 million untreated Shiga bacilli given at weekly intervals this animal was found to be immune to approximately ten times the fatal dose of these organisms for an animal of the same weight.

The minimum lethal dose of the strain of Shiga's bacillus utilized in these experiments was found to be 0·01 mgm. (equivalent to 20 million bacilli), which was just sufficient to kill a rabbit of 1,000 gm. in three days when injected intravenously; when given by the subcutaneous route the dosage was found to be considerably larger and to be 1 mgm. of dried bacilli. The amount of alcohol required for reducing the toxicity of Shiga's bacillus was considerable, so that precipitation with ammonium sulphate, as being more rapid and economic, was resorted to.

To a thick emulsion of Shiga bacilli an equal bulk of liquor ammoniae fortis (B.P.) was added; the mixture after being incubated at 37° C. overnight being neutralized by 20 per cent. sulphuric acid. No precipitation occurs till the neutral point is reached. The precipitate is practically non-toxic. Little reliance being placed upon agglutination production in rabbits as an index of the degree of immunity conferred, a series of 10 rabbits was inoculated, five subcutaneously and five intravenously with ammonia-treated bacilli, with the result that all the animals inoculated subcutaneously survived without any obvious reactions, save a slight temporary loss in weight. Three of the series injected intravenously died after the first inoculation, which was apparently too large, but the two which had received 0·1 mgm. survived and afterwards received larger doses, without any ill effects. The anti-toxic power of the serum of the immunized animals was not so great as had been anticipated, but one animal injected with 0·1 mgm. (10 M.L.D.) survived.

Human experiments on a large scale have not yet been carried out. Subcutaneous injections of 0·03, 0·075, 0·15 and 0·3 mgm. of treated Shiga bacilli (equal to 60, 150, 300 and 600 millions) caused slight local tenderness and induration which persisted for some days.

P. H. M-B.

WATANABE (Ryu). **[An Experiment on Lipovaccine of** *Bacillus dysenteriae* **Shiga.]**—*Gun-I-Kwai Kwaiho* (*Proc. of Navy Med. Corps*). 1921. Oct. No. 34. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 84.]

Lipovaccines were prepared with heated olive oil. No difference was noted between this preparation and heated saline bacillary emulsions in the production of opsonins, etc. Being less toxic to guinea-pigs, he considers it superior for human injection.

P. H. M-B.

THJÖTTA (Th.) & SUNDT (Odd Falsen). **Toxins of** *Bact. dysenteriae,* **Group III.**—*Jl. Bact.* 1921. Sept. Vol. 6. No. 5. pp. 501–509.

Bacillus dysenteriae of Group III of SONNE [see this *Bulletin,* Vol. 7, p. 222], a Flexner bacillus of peculiar characters, produces toxins allied to the toxic strains of *B. dysenteriae.* It is atoxic in a mild degree for rabbits and monkeys. It is the same organism as the type E of Kruse, 1907. Preliminary experiments on rabbits with a locally isolated strain of Shiga's bacillus showed that the technique was suitable for obtaining a good yield in exo- and endotoxin. Working with Group III they found an initial acid production in the medium followed by a period of alkalinity; the toxin production apparently does not begin until the alkaline period has set in. Broth in which the organism was cultured was filtered through a Berkefeld filter and the filtrate tested for sterility, and the toxin thus prepared injected into rabbits and white mice. The exotoxin injected intravenously produces distinct paresis of the extremities; no diarrhoea was observed and no deaths occurred.

The endotoxins were prepared by inoculating large agar flasks and emulsifying the 24-hour growth in normal saline. The emulsion is placed in the incubator for autolysis for two days, then filtered through Berkefeld candles, tested for sterility and injected into rabbits. The rabbits thus injected with endotoxins of dysentery bacillus Group III showed intestinal disturbances indicated by diarrhoea. In no case was there paresis.

Experiments on anti-toxin production showed a distinct protective action of the anti-endotoxin serum against its homologous toxin, while control tests with endotoxin and anti-exotoxin serum did not show protection. It seems justifiable to consider the toxic effect of the extract of dysentery bacilli as a specific action due to the endotoxins of the dysentery bacillus rather than to a non-specific protein toxicity.

The conclusion reached is that repeated injections of these toxins over a relatively short period of time render rabbits immune and their sera show a weak protective action against the homologous toxins.

P. H. M-B.

LISBONNE (M.) & CARRÈRE (L.). **Antagonisme microbien et lyse transmissible du bacille de Shiga.**—*C.R. Soc. Biol.* 1922. Mar. 18. Vol. 86. No. 11. pp. 569–570.

The authors have recently demonstrated the possibility of obtaining a bacteriophagic substance destructive to Shiga's bacillus by bringing a bouillon culture of Shiga's bacillus into contact with several drops of a leucocytic extract *in vitro.* The elaboration of this lytic principle can hardly be explained by the intervention of D'HERELLE's intestinal bacteriophage. The following experiments are cited:—

A broth culture of Shiga's bacillus is inoculated with a trace of *Bacillus coli.* After a variable time in the incubator it is filtered through a Chamberland L.3. To 10 cc. of bouillon 20 drops of the filtrate are added and a fairly opalescent emulsion of Shiga's bacillus. After incubation this is again filtered, and so on, till at the third or fourth passage the total lysis of Shiga's bacillus can be observed. Furthermore, seven trials with five strains of *B. coli* isolated from urine and stools have been made on similar lines. The lysate in this case is active against three Shiga cultures. Substitution of Proteus X_{19} for *B. coli* has given identically the same results. In light of these researches the authors consider themselves justified in suggesting that the presence of a Shigaphagic body in the stool is the result of microbic interaction analogous to that observed *in vitro.* Another theory which has supporters is that the bacteriophagic substance is a parasitic and ultramicroscopic parasite living in these various bacilli. This view, the authors think, is opposed to all accepted views upon the general biology of bacteria.

P. H. M-B.

JONESCO-MIHAESTI & POPESCO (C.). **L'influence de la concentration en ions H sur le développement et la production de toxines par le Bacille de Shiga.**—*C.R. Soc. Biol.* 1922. Apr. 29. Vol. 86. No. 15. pp. 893–895.

The concentration of hydrogen ions would appear to exert a considerable influence upon the production of toxins of micro-organisms in general. The authors set out to determine the optimum conditions for the development of Shiga's bacillus and also the concentration of hydrogen ions most favourable to toxin production by this bacillus. To the filtrate of a bouillon culture of Shiga's bacillus is added 3 gm. NaCl., 2 gm. phosphate of soda and 15 gm. of peptone to every 1,000 cc. This is boiled for 30 minutes and after filtration through filter paper the reaction is adjusted by addition of Hcl or NaOH in order to obtain the P_H necessary; after further filtration it is sterilized for 5 minutes at 120° F. The limits of the ion concentration in which the development of Shiga's bacillus may take place lie between a $P_H = 5{\cdot}4$ in the acid zone and a $P_H = 9{\cdot}1$ in the alkaline zone. The optimum reaction for toxin production would appear to be $P_H = 7{\cdot}5$ during the first 24 hours of incubation.

P. H. M-B.

MIXED AND UNCLASSED DYSENTERY.

HAUGHWOUT (Frank G.). **Observations on the Differential Diagnosis of the Dysenteries.**—*Jl. Philippine Islands Med. Assoc.* 1921. Mar.–Apr. Vol. 1. No. 2. pp. 53–58.

The microscopist is under obligation to render to the clinician a full and complete report of anything of importance he has noted in the stool specimen. A bare report of the parasitological or bacteriological findings is not sufficient. The finding of *Entamoeba histolytica* in a stool does not necessarily mean that the patient is suffering from amoebic dysentery, any more than does the failure to isolate *Bacillus dysenteriae* signify that he is not suffering from bacillary dysentery.

The inability to secure reliable bacteriological results, unless the specimen is secured immediately it is passed, may be due to the activities of D'HERELLE's bacteriophagic organism. Gross inspection of the entire stool passed by a dysenteric is not, in the author's judgment, a safe means of determining the etiology of a given dysentery.

P. H. M-B.

MACKIE (F. P.), with TRASLER (George). **Laboratory Records from Mesopotamia.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 85–92.

With experience, it is possible to diagnose acute bacillary dysentery by naked eye inspection of the stool. The typical stool resembles scrapings of raw flesh floating in raw meat juice. The usual technique was employed and not infrequently a pure culture of dysentery bacilli without a single *B. coli* colony was obtained. Preliminary microscopic agglutination of selected colonies was invariably carried out. Under the most favourable conditions when the stools are despatched fresh to the laboratory, as they were at Amara, 60 per cent. of positive isolations can be obtained. The following table shows results obtained in 30 months from July, 1916, to December, 1918 :—

Year.	Shiga.	Flexner.	Irregular Strains.	Total Positive.	Percentage of +.	Total Negative.	Percentage of Negatives.	Total Plated.	Total Non-amoebic Stools Received.
July, 1916, to March, 1917	61	46	—	107	37·1	183	62·9	288	543
April, 1917, to March, 1918	50	49	22	121	40	177	60·0	298	440
May, 1918, to December, 1919 [1918 ?]	117	83	15	215	40·1	320	59·9	535	552
Total	228	178	37	443	39·0	680	61·0	1,121	1,535
Percentage of total plated	20·3	15·8	3·3	—	—	—	—	—	—
Percentage of positives	51·4	40·1	8·3	—	—	—	—	—	—

Out of 1,121 stools plated 443 (39 per cent.) were positive and 680 (60 per cent.) negative ; B. Shiga was present in 20·3 per cent., and B. Flexner in 15·8 per cent., whilst 3·3 per cent. were of undetermined nature. Another table is given showing the results of isolation from non-blood and mucus stools in Baghdad in 1918. Out of 364 specimens only 10·9 per cent. were found to yield specific bacteria, and, as might be supposed, Flexner infections were twice as numerous as Shiga. Figures obtained from Indian hospitals were small, but they tend to show that successful recovery of Shiga and Flexner strains in British cases were 32·6 per cent., whilst in Indian it was only 22·6 per cent. The chances in favour of recovering Flexner strains from unsatisfactory faecal specimens are greater than in Shiga infections. A summary shows that of blood and mucus stools 47·6 per cent., of mucous and diarrhoeal stools 30·6, and of partly formed motions 18·6 per cent., were positive.

Classified according to duration of disease, during the first week 80 positives were obtained out of 157 cases = 50·9 per cent.

During second week 16 positives out of 44 cases = 36·3.
During third week 5 „ „ 18 „ = 27·7.
During fourth week 29 „ „ 73 „ = 39·7.

An analysis of irregular strains failed to show any hitherto unascertained points. An epidemic of fulminating bacillary dysentery in a refugee camp at Baquabah, near Baghdad, is described. In a series of 95 blood and mucus stools examined 20 per cent. were found to contain *E. histolytica* and 80 per cent. were certainly bacillary. One hundred and fourteen autopsies were performed in 14 days and the gut lesions were described as intensely necrotic. During the course of these investigations in the wards and post-mortem room they failed to isolate the dysentery bacillus from the blood during life, or from the gall-bladder, liver or mesenteric glands after death.

The epidemiological evidence in favour of the dissemination of dysentery by flies is regarded as very strong in most tropical countries, and in Mesopotamia it was almost conclusive.

With reference to "flagellate dysentery" the accumulated figures further tend to bear out the opinion that these parasites are harmless commensals and play no part whatever in the production of disease. One telling instance is quoted—that of a persistent diarrhoea with enormous numbers of *Lamblia intestinalis*; when, however, the stool was cultured it was found to contain cholera vibrios in large numbers.

P. H. M-B.

GARCIA MARTINEZ (Arturo). **Sindroma leucocitario disenterico.**—*Repert. de Med. y Cirug.* 1921. Aug. Vol. 12. No. 11 (No. 143). pp. 600–617.

The author starts by making some preliminary remarks of a general nature on the value of leucocytic estimations of the blood and alterations in the relative percentages of the constituent varieties. The remainder of the paper deals with the leucocytic pictures in amoebic and bacillary dysenteries and in diarrhoea associated with ankylostomes, ascaris and trichuris, which he designates "helminthic dysentery."

He states that in the amoebic variety there is a slight eosinophilia, the other elements being relatively normal or exhibiting a mononucleosis. In the bacillary and in helminthiasis there is a polymorphonucleosis, with, in the latter, an increase of eosinophiles.

In some of the cases cited he also examined the stools microscopically. So greatly does he rely on the blood examination that he allows it to replace the bacterial and bases his treatment upon his findings. There is no mention of any total counts being made. He records ten cases which he diagnosed and treated as amoebic dysentery, although in five of them no amoebae or cysts were detected; three are given in the second group, diagnosed as bacillary dysentery and treated with serum, and ten in the third treated with chenopodium or thymol.

[Unfortunately the figures given do not bear out the hypotheses. Thus, in the first group the constituents are not "present in relatively normal proportions, except for a slight eosinophilia." Of the examples given the neutrophiles vary between 33 and 75 per cent.; the eosinophiles between 0 and 8 per cent.; the lymphocytes between 20 and 60 per cent. Among the counts in the other two groups we find the following three :—

A.	Polymorph. 81,	Eosinoph. 1,	Lymphocyt. 15,	Large Mono. 1,	Transit. 2.
B.	,, 80,	,, 2,	,, 12,	,, ,, 4,	,, 2.
C.	,, 79,	,, 2,	,, 14,	,, ,, 2,	,, 3.

These are so closely similar that the differences are within the limits of personal error; nevertheless, A. was treated with antidysenteric serum (presumably because no ova were found), B. with oil of chenopodium, C. with thymol, and all three cleared up. The diagnosis would appear to have been based as much on instinct as on the differential leucocyte count.]

H. Harold Scott.

Piltz (G.). **Ueber die Stellung der Ruhr unter den Ernährungsstörungen im Kindesalter.** [Dysentery in Relation to Nutritional Disturbances in Children.]—*Jahrbuch d. Kinderheilk.* 1922. May. Vol. 98. 3rd Ser. Vol. 48. No. 3–4. pp. 153–175. With 1 chart in text.

Dysentery is commoner in sucklings and children than has frequently been believed. As a cause of mortality during the summer months it is now playing, in Germany, at any rate, an important and increasing rôle, and the spread of infection may be directly ascribed to the war. Formerly, too, a large number of cases of dysentery were mistaken for examples of other diseases. In 1911–12 dysenteric lesions were recorded as occuring in 15 out of 774 post-mortems on infants, or 1·9 per cent.; in the same period 1920–21, in a series of 821 cases, similar lesions were recorded in 3·2 per cent.

In the author's opinion, in the recognition of dysentery or dysentery-like diseases, bacteriological or serological investigations play a minor part as compared with the clinical picture and gross pathological appearances at autopsy. In only well-marked cases can a bacteriological diagnosis of any value be obtained. The infectious character of the disease is particularly important.

In many acute cases of dysentery the outstanding symptoms are brought about by nutritional disturbances consequent upon the infection. Involvement of the kidney and urinary passages is encountered in dysentery in the form of pyelocystitis and pyelonephritis and renders the prognosis exceedingly grave.

P. H. M-B.

Labbé (Marcel) & Bith (Henry). **Insuffisance hépatique aiguë et acidose au cours de la dysenterie.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. May 18. 38th Year. 3rd Ser. No. 16. pp. 760–764.

The authors give a clinical record of frequent dysenteriform attacks in an elderly lady. Death took place suddenly with symptoms of acidosis and hepatic insufficiency amply confirmed by frequent and exact urine analyses.

Stool cultures did not reveal any particular micro-organism as the cause of the enteritis, and at autopsy a grave parenchymatous degeneration of the liver was manifest. In the discussion other observers recorded their experience of a similar condition in choleraic forms of dysentery.

P. H. M-B.

LE ROY DES BARRES (Adrien). **L'appendicite dysenterique.**—*Rev. Méd. et Hyg. Trop.* 1922. Mar.–Apr. Vol. 14. No. 2. pp. 42–50.

The possibility of appendicular inflammation occurring in the course of a dysentery has been recognized for the last 20 years. Dysenteric appendicitis may occur in Shiga dysentery as well as in amoebiasis and bilharzial dysentery. The ulceration causing appendicular inflammation may be slight or extensive. Perforation does not usually result in abscess but in a general peritonitis. Appendicitis may occur :—

(*a*) Prior to the appearance of dysenteric symptoms.

(*b*) Simultaneously with other signs of dysentery.

(*c*) During the course of a dysentery, especially of a relapsing and chronic character.

P. H. M-B.

YOUMANS (L. E.) & YOUMANS (John B.). **A Disease Clinically resembling Epidemic Dysentery. Report of Outbreak in a Rural Community.**—*Jl. Amer. Med. Assoc.* 1922. June 10. Vol. 78. No. 23. pp. 1798-1801. With 1 chart in text.

An epidemic of acute dysentery occurred in a rural district in Wisconsin. There were 46 cases of a severe type with fever, mucoid and bloody stools, pain and tenesmus, and 120 cases of a milder type with no deaths, complications or sequelae. Water supply could be exculpated and the presence of an unusual number of flies during the summer was assumed to have a bearing upon the spread of infection.

In many ways it resembled true epidemic dysentery, especially in its wide range of age incidence ; it did not show, moreover, the usual sequelae of subacute or chronic dysentery. Examination of satisfactory stool specimens failed to yield *B. dysenteriae* or allied groups, and this failure is ascribed to the fact that specimens had to be forwarded a considerable distance for bacteriological examination.

P. H. M-B.

HAUSMANN (Theodor). **Die rigorose Abführbehandlung der Dysenterie, insbesondere durch medikamentös erzeugten osmotischen Transsudationsstrom in den Darm.** [Drastic Purgative Treatment of Dysentery, especially by Osmotic Transudation produced by Drugs.]—*Deut. Med. Woch.* 1922. May 12. Vol. 48. No. 19. pp. 628–631.

Hausmann, writing on his experiences in Moscow, does not believe that anyone, especially if rigorously treated from the commencement, should die of dysentery. He further distrusts the serum treatment of the disease as not founded on a scientific basis ; since 1904 he has not used this method. Up to that year he had adopted the treatment by opium and astringents. At that time the death-roll in his practice had been quite considerable, but since his conversion to the opposite line of treatment (calomel, castor oil, and the saline purgatives) it has been negligible. With regard to special symptoms, he believes that atropine is of distinct use in relieving the pains and tenesmus. The rational treatment of dysentery should then be conducted on the following lines :—Complete evacuation of the contents of the large intestine by means of sodium sulphate. Astringents, especially opium, should be avoided. Adsorbents, bolus and charcoal are uncertain in their action. The course of the disease is shortened by institution of hunger days. In the acute stage medicinal enemata are useless.

P. H. M-B.

DE LAVERGNE (V.). **Localisations rectales de la symbiose fuso-spirillaire au cours de la dysenterie amibienne.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. 38th Year. No. 13. pp. 620–624.

Spirochaetes are numerous in the stools of amoebic dysentery. De Lavergne reports finding them in 70 per cent. In four chronic cases examined by means of the sigmoidoscope ulcerations and other lesions of the mucosa were present. Microscopic preparations obtained from these ulcerations showed large numbers of spirochaetes and fusiform bacilli. It is thought that the presence of this organism in large numbers is responsible for the chronic intractable emetine-resistant cases of amoebic dysentery.

P. H. M-B.

DE LAVERGNE (V.). **Symbiose fuso-spirochétaire et dysenterie.**—*Paris Méd.* 1922. June 3. 11th Year. No. 22. pp. 467–471. With 1 fig.

As a result of prolonged clinical observation de Lavergne believes that a spirochaetal infection of the tissues takes place secondary to prolonged amoebic ulceration. It is a symbiosis between the fusiform bacillus and the spirochaete for which certain alterations in the mucosa of the intestinal tract are necessary. Normally these organisms are present in the saliva, but not until abnormal conditions in the digestive tract prevail do they obtain a footing in the large gut.

It is a remarkable fact that, notwithstanding careful search, intestinal spirochaetosis has never been reported in the course of, or secondary to, bacillary dysentery. Most frequently the spirochaetes are associated with *Entamoeba histolytica* ; in some cases with other parasites, such as Lamblia or Trichocephalus ; very seldom not in association with some or other pathogenic agent. In a series of chronic amoebic dysenterics infected during the war and systematically searched, intestinal spirochaetosis was found in 76 per cent.

To classify the intestinal spirochaetes on a morphological basis does not seem to be possible, on account of their polymorphism.

According to de Lavergne specimens containng spirochaetes and fusiform bacilli are best obtained in smears of false membrane detached from the intestinal wall through the sigmoidoscope. The cytology of this false membrane is peculiar ; it contains cellular accumulations of red cells, mononuclears and rarely polymorphonuclear cells, no eosinophils as commonly met with in pure amoebic lesions. Active amoebic lesions are most frequently found in the lower part of the large gut and it is just in these situations too that spirochaetes are most abundant. De Lavergne is convinced that these organisms are secondarily implanted in the amoebic lesions and that they are responsible for the persistance of intestinal ulceration, and that the beneficent results of injection of salvarsan compounds in these cases may thus be explained.

P. H. M-B.

VAN NITSEN (R.) & BEQUAERT (M.). **A propos de l'entérite à spirochètes.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 305–307.

This paper consists of a report of a case with dysenteriform symptoms in which the *Spiroschaudinnia eugyrata* (Werner) is given as the cause. No amoebae or cysts were found in the stool and the serological reactions were negative both to Shiga and Flexner bacilli. The organisms were present in large numbers in the purulent discharges. They measured 2–11μ in length by 0·25μ in breadth. The number of spirals varied from 2–10.

P. H. M-B.

BAUJEAN. **Dysenterie balantidienne à** "*Balantidium coli*" **observée à Dakar.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Apr. Vol. 3. No. 14. pp. 52–54.

Two cases of so-called "balantidial dysentery" were observed at Dakar. The first, a Senegalese tirailleur, was infected with taenia, ascaris, ankylostomes, trichocephalus, bilharzia, and finally *Balantidium coli*; the latter were present in considerable numbers and were very active. Treated for his various helminthic infestations, the patient improved gradually and at the end of two months his stools were normal in appearance and the balantidia had vanished; in this case these organisms appear to have played a secondary rôle.

The second case presented a totally different complexion. His illness could not be ascribed either to amoebiasis or bilharziasis; retrogression was rapid and death ensued.

The numerous diarrhoeic stools contained bloodstained mucus—microscopically they literally swarmed with balantidia. At autopsy (one hour after death) localized lesions were found in the large intestine, especially in the caecum, which was hypertrophied to double its normal thickness; ulcers were numerous and of all sizes. The mucous membrane was distorted and engorged; some lesions were superficial, others deep. In haematoxylin stained sections balantidia were demonstrable in numbers not only in the glandular ducts, but also in the interglandular tissue and in the submucosa.

P. H. M-B.

GRAZIADEI (Giorgio) & MARIO (Stanzani). **Osservazioni sopra un caso di dissenteria da** "*Balantidium coli.*"—*Pathologica.* 1922. Aug. 1. Vol. 14. No. 329. pp. 464–465.

The patient, a peasant, 50 years of age, had suffered for six months from diarrhoea, slight abdominal pain and frequent tenesmus. The faeces contained numerous balantidia, a few giardia, some trichomonas, and also ova of ascaris, trichuris, and *Strongyloides stercoralis*.

Repeated examination failed to reveal any amoebae. The man was accustomed to eat raw salad grown on soil fertilized with manure from pigs which he kept. Inoculation of guinea-pigs and a cat per rectum with the faeces yielded no results.

Treatment consisted in regulating the diet and in injecting emetine intramuscularly in doses of 0·03 gm. (0·45 gr.) daily. The actions, which were 10–15 in number on admission, were rapidly reduced and in eight days the motions were formed and no balantidia were discovered in them. The worm ova continued to be excreted and for these the patient was treated with thymol.

H. Harold Scott.

KOLISCH (R.). **Ein Fall von Balantidiasis coli.**—*Wien. Klin. Woch.* 1922. Mar. 16. Vol. 35. No. 11. pp. 246–247.

Records a case which occurred in the author's practice, but which presented no features of exceptional interest.

P. H. M-B.

BORDONI POSSE (César). **Zur Kenntnis der pathologischen-anatomischen Veränderungen bei gleichzeitigen Infektionen mit Ruhr- und Enteritis- (Paratyphus- oder Gärtner-) Bacillen.**— *Virchows Arch. f. Path. Anat. u. Physiol.* 1922. Mar. 28. Vol. 237. No. 3. pp. 380–399. With 4 text figs.

CAMMAERT (C. J.). **Ernstige dysenterie in Zeeuwsch-Vlaanderen.** [Correspondence.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 19. Year 65. 2nd Half. No. 21. pp. 2593–2594.

GUIMARÃES (Aristides). **Epidemia de dysenteria bacillar.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. Dec.–1922. Jan. Vol. 4. Ser. 2. Nos. 10–11. pp. 293–294.

KRAMER (P. H.). **Bacillaire dysenterie in Zeeuwsch-Vlaanderen.** [Correspondence.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 26. Year 65. 2nd Half. No. 22. p. 2735.

KREMER (W.). **Ernstige dysenterie in Zeeuwsch-Vlaanderen.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 5. Year 65. 2nd Half. No. 19. pp. 2300–2301.

PARANHOS (Ulysses) & REIS (Paiva). **Formas atypicas da amibiase intestinal.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Ser. Nos. 5 & 6. pp. 123–126.

POL (O. J. Hulshoff). **Dysenterie in Zeeuwsch-Vlaanderen.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Dec. 10. Year 65. 2nd Half. No. 24. pp. 2909–2910.

TROPICAL OPHTHALMOLOGY.

SICHEL (A. W. S.). **The Incidence of Conjunctivitis in Relation to Rainfall.**—*S. African Med. Rec.* Dec. 24. Vol. 19. No. 24. pp. 470–474. With 3 charts.

The author was engaged in the investigation of an epidemic of conjunctivitis occurring on Christmas Island. The climate in this locality shows a well-marked wet season, extending from January to May, and an equally distinct dry season from May to December, whereas the temperature is extraordinarily uniform. The mean annual temperature is 80·7° F., the extremes in the monthly averages throughout the years under observation showing a difference of only 2 degrees, while the diurnal range does not exceed 14 degrees. The industry of the island is the production of phosphate of lime. The phosphate quarries reflecting the sun cause an extreme glare, whilst the phosphatic dust is extremely irritating. Complete meteorological records for the past 14 years were in existence, and hospital records for the same period were available. It was thus possible to construct charts which show most strikingly the close relationship that exists between dry weather and the epidemics of conjunctivitis. The influence of glare and dust upon the causation of inflammations of the conjunctiva is clearly proved.

R. H. Elliot.

CUMSTON (Charles Greene). **A Brief Historical Summary of the Treatment of Trachoma, with Special Reference to the Arabian School and the Writings of Ali Ibn-el-Aïssa (Jesu Hali).**—*Proc. Roy. Soc. Med.* (Sect. History of Med.). 1921. Sept. Vol. 14. No. 11. pp. 43–51.

This very interesting paper does not lend itself to abstraction and should be read in the original. It is noteworthy that friction, massage, and the application of astringents (especially copper) were recognized from the days of Hippocrates onwards as valuable methods of treatment for trachoma.

The writer furnishes copious extracts from the *Tadkirat-el-Kahhaline,* a treatise written at Baghdad during the eleventh century by Ali Ibn-el-Aïssa.

R. H. E.

NICOLLE (Charles). **Etat de nos connaissances d'ordre expérimental sur le trachome.**—*Bull. Inst. Pasteur.* 1921. Dec. 30. Vol. 19. No. 24. pp. 881–894.

The writer prefaces his paper with the very true remark that we cannot say with certainty whether different, though allied, infections are not confounded under the name of trachoma. The paucity of animals susceptible to the disease is a cause of difficulty in experimental research. The chimpanzee, though suitable for the purpose, is difficult to obtain; the Algerian baboon (*Macacus innuus*) was, however, found by Nicolle and CUÉNOD to be a very satisfactory subject.

Inoculation in the baboon is followed by an incubation period of 10 days, during which time no reaction whatever is noticed; the conjunctiva then becomes hyperaemic, oedematous and infiltrated, and about the 14th day a few small granulations appear along the upper margin of the superior tarsal plate. These granulations quickly assume a typical aspect and cover a large portion of the mucous membrane. The effect produced by the inoculation and the duration of the disease appear to vary according to the virulence of the material employed.

The virus was found to be active after passage through a Berkefeld filter No. V. It lost its virulence after having been for eight days on ice; preservation in glycerine was also found to affect it deleteriously.

Trachoma was found to be virulent and contagious during the whole course of the disease, and even the tears of trachomatous subjects were found to be infective. The smallest lesion of the conjunctiva may allow the infection to gain a footing.

Nicolle emphasizes the important part played by flies in the spread of the disease; fly destruction and segregation of trachomatous patients in fly-proof wards must therefore be regarded as two most essential steps in prophylaxis.

The author appears to be sceptical as to the existence in man or in the lower animals of any natural immunity to the disease. He is of opinion that the subconjunctival or subcutaneous injection of the products of curettage, obtained from the patient himself, is, at any rate, a useful adjuvant to the ordinary treatment of the disease.

Trachoma bodies, apparently identical with those described by PROWAZEK and HALBERSTAEDTER, were found in the early cases of experimental trachoma in the chimpanzee and in many of those amongst baboons and rabbits; they were not found, however, once the disease had reached a cicatricial stage. Nicolle is inclined to attach some significance to their presence in experimental trachoma, but finds it difficult to appraise their real importance.

R. H. E.

THACKER-NEVILLE (W. S.). **Treatment of Trachoma, a Translation from Therapeutique oculaire (Dr. Robert, 1920).**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 474–477.

This paper describes the various remedies recommended by Dr. ROBERT for the treatment of trachoma. A rather novel method of therapeusis mentioned is the use of oxidized naphthol. The drug "is prepared by gently heating two parts of camphor and one of naphthol. It is then filtered. While filtering it do not expose it to the air (on filtre a l'abri de l'air), and one allows the naphthol and camphor to combine in a flask of white glass, until it has the consistence of syrup and is of a mahogany colour." The naphthol camphor is only used after it has been oxygenated for several days by exposure to the air and light.

It is highly important to protect the cornea during and after the application of the drug. This is effected by placing a fold of fine old linen cloth in the upper fornix after everting the lid. The lower fold protects the cornea, whilst the upper fold is used to dry the tarsal conjunctiva.

The application is followed by rather severe pain at first, but later applications have a rather sedative effect. The drug is used two or three times a week. It is claimed that the treatment produces very little scarring. It is advisable to use it in combination with silver nitrate in chronic cases.

R. H. E.

Solovief (Pierre). **Examen histologique de quelques pièces de trachome expérimental du lapin et du magot.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 388–413. With 2 plates.

A very complete description is given of the histological changes found in experimental trachoma in the course of work at the Pasteur Institute at Tunis.

The tissues were fixed in Zenker's or in Schaudinn's fluid and stained with Giemsa, and haematoxylin and eosin.

The conclusions arrived at are that the experimental lesions are histologically identical with those of naturally acquired trachoma in the human subject, although the experimental disease runs a mild course free from complications. Prowazek's corpuscles are common in the early stages of both human and experimental trachoma ; they are believed by Solovief to be derived from products which are the result of degeneration of the cell nucleus, and to have a real value in the diagnosis of trachoma.

R. H. E.

Lumbroso (Ugo). **Observations relatives aux corpuscules de Prowazek et à leur signification dans le trachome, la blennorrhée et d'autres infections conjonctivales.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 414–421.

Lumbroso's examination included 77 cases of various kinds of conjunctival inflammation and 10 in which the conjunctiva was normal. He found Prowazek's corpuscles present in nearly 63 per cent. of the patients suffering from trachoma in the early stage, but absent in the remaining 37 per cent. The corpuscles were found, on the other hand, in 100 per cent. of cases of non-gonorrhoeal blenorrhoea of the newly born. They were absent in all other varieties of conjunctival inflammation examined except in one case of gonorrhoeal ophthalmia neonatorum ; the finding in this last case was doubtful.

Lumbroso advances the hypothesis that Prowazek's corpuscles represent an aetiological factor in a specific conjunctival infection which is very frequently associated with early trachoma, and that a mixed infection is present when they are found in a trachomatous patient. Non-gonorrhoeal ophthalmia neonatorum is quite likely to be the specific infection in question, since the corpuscles are not only present during all stages of this disease, but are particularly abundant in it.

R. H. E.

du Toit (J. S.). **Quinine Amaurosis.**—*S. African Med. Rec.* 1922. Jan. 14. Vol. 20. No. 1. pp. 8–10.

Du Toit reports an unusual case of quinine amblyopia. The patient, age 40, had been in the habit of taking prophylactic doses of quinine (5–10 gr.) off and on for about 18 years, and had been treated for malaria repeatedly with 20 gr. of quinine. At 6 p.m. one evening, having been attacked by malaria, he took 39 gr. of quinine hydrochloride in tablet form. A few hours later he was found to be deaf, and suffering from severe vomiting. Six hours after the drug was taken his pupils were dilated, but his sight remained good. On waking two hours later he was unable to see the light in the room. The fundi presented the usual ischaemic appearance. The loss of hearing was very transitory. The total blindness remained for seven weeks, when the sight gradually began to return, and for two months he enjoyed fairly useful vision. Five months after he was first seen the sight again failed, and a month later total and permanent blindness had supervened. There was then a condition of advanced optic atrophy associated with very narrow retinal vessels; the arteries were specially affected and showed white lines along their walls.

Du Toit finds it difficult to explain the loss of sight on the second occasion. He suggests that it may have been due to the effect of alcohol and tobacco upon ganglion cells and nerve fibres already damaged by the quinine.

R. H. E.

ORMOND (Arthur W.). **Some Cases of Quinine Amblyopia and Notes on its Pathology.**—*Guy's Hosp. Reports.* 1921. Oct. Vol. 71. (Vol. 1. 4th Ser.) No. 4. pp. 461–471.

This paper records six cases of amblyopia following the administration of quinine for malaria acquired during military service. Four of these ended in loss of useful vision. Three symptomatic stages are noted: (1) the initial loss of sight; (2) a partial recovery; (3) a subsequent failure which may leave the patient diminished sight, or even none at all. After a lapse of one or two years the changes in the eye are almost stationary.

Ormond considers that the early ophthalmoscopic signs, resembling embolus of the central retinal arteries, are due to a spasm of the vessels, resulting in a partial coagulation-necrosis of the inner retinal layers. The spasm does not persist permanently, but relaxes, and the contracted appearance of the vessels is apparent only. The last stage, when permanent contraction is a reality, is consequent on the optic atrophy which is the final result of the condition. He most properly states that the existence of quinine amblyopia ought to be more widely known, now that heroic doses of the drug are being advocated in the treatment of malaria. The reviewer has persistently preached the latter doctrine for a number of years.

R. H. E.

WRIGHT (R. E.). *Rhinosporidium kinealyi* **of the Conjunctiva.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 82–83.

After references to previous cases of the condition reported, and to the clinical appearances of the disease, an account is given of its occurrence in three Eurasian boys of the Madras Civil Orphan Asylum. The polypi, when they occur in the conjunctiva, become flattened out by the lid pressure, and their edges show a delicate fringe in which tiny yellow granules can be seen. In one case a polypus was bilobed and was suggestive of the lungs of a mouse.

Some points concerning the cases are noteworthy: (1) the presence of the growths was unsuspected by the boys and was only discovered in the course of a routine examination of the school made on account of an epidemic of conjunctivitis; (2) the boys had been residing in the institution for over six years, and only one of them had been on holidays outside Madras. None of them had been to the West Coast (the disease is specially prevalent in Malabar, Cochin and Travancore); (3) the three boys were much of an age; (4) the Institution is provided with a large swimming bath, freely used by the whole school throughout the year. The water is easily contaminated by dust and is said to be changed "once in two or three weeks"; (5) none of the cases showed involvement of the lachrymal sac or nose; Wright states that the same remark applies to the cases previously reported; but in this he is mistaken, for KIRKPATRICK observed a small rhinosporidial polypus in the inferior meatus of the patient in whom he reported a similar infection of the lachrymal sac. The polypus occurred on the same side as the original infection and about four years later; (6) although the school contains 60 girls and 94 boys, who live under practically the same conditions except that they use different playgrounds, no cases occurred amongst the girls.

Wright suggests that the position of the growths points to dust or water transmission.

R. H. E.

WRIGHT (R. E.). *Rhinosporidium kinealyi* **of the Conjunctiva cured by Tartarated Antimony (Tartar Emetic), and Notes on a Case in which the Lachrymal Sac was affected by this Sporozoon.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 81–82.

This represents an important note upon the treatment of an infection which is frequently very difficult to eradicate completely from the naso-pharynx. The conjunctival polypus measured 5 mm. by 5 mm. and was a flattened disc with a narrow pedicle. The treatment was at first confined to the instillation of quinine drops, from 1 per cent. to 2 per cent., three times a day. This was continued for about seven weeks with no apparent good effect, indeed the growth appeared to increase in size. A 2 per cent. aqueous solution of tartarated antimony drops was then substituted and the growth gradually got smaller and smaller. In a month it had decreased by a half, in two months it had almost gone, and in three months there was not a trace of it.

The other portion of the paper refers to a rhinosporidial infection of the lachrymal sac, being apparently the second of this nature to be placed on record. A Moplah had a red tense swelling of the size of a filbert in the region of the sac. A small sinus was present in its upper part from which thin purulent matter escaped. The lachrymal groove was expanded, but caries was absent. Large masses of rhinosporidial polypi sprang from the middle and inferior turbinals. The sac had a fibrous wall with polypoid projections from its inner surface; these completely filled its lumen.

R. H. E.

WRIGHT (R. E.). **Extirpation of the Lachrymal Sac.**—*Indian Med. Gaz.* 1922. Feb. Vol. 57. No. 2. pp. 52–54.

This paper contains a full description of the Madras operation for excision of the lachrymal sac. Wright takes particular care to avoid injury to the angular vein, so that the operation is usually bloodless.

Local anaesthesia is used (2 per cent. novocaine in 1 : 10,000 adrenalin, approximately). The swelling, caused by the injection, is dispersed by firm pressure, and the incision, commencing just above the internal tarsal ligament, is made through the skin and subcutaneous tissues. Care is taken to note the position of the vein and to avoid it when making the incision; the skin is kept on the stretch with the fingers of the left hand. A Mellor's retractor is next inserted and a quadrilateral field is exposed across the upper third of which runs the white and prominent tarsal ligament, whilst the lower two-thirds are occupied by the oblique fibres of the orbicularis. The orbicularis fibres are separated by the back of the knife point, and the fascia, which covers the sac, appears in the gap. The fascia is next split with the knife point and the sac is exposed. The edge of an Elliot's dissector is inserted into the gap in the fascia, and, by moving the instrument up and down, the outer side of the sac is freed. The movement is continued posteriorly and downwards, and then the instrument is carried across the front of the sac and used to separate it on the inner side and below at the commencement of the nasal duct. The last step is the separation of the dome ; this is effected by a sweeping movement of the dissector, which is used in a similar fashion to an egg spoon when evacuating the contents of a boiled egg.

The internal tarsal ligament is as often cut as not. Wright contends that its division is attended by no bad results, an opinion which the reviewer does not share. When the sac has been completely lifted from its bed, the blades of the scissors are pushed down the canal and the nasal duct is divided as low as possible. The lining membrane of the duct is then inverted by a few strokes of a curette and is pushed down into the inferior meatus. Occlusion of the canaliculi, as advised by GREENWOOD, is effected by clamping them with Halstead's mosquito forceps before cutting them.

Wright concludes by drawing attention to two points of technique : (1) occlusion of the canaliculi, as practised by Dr. GREENWOOD ; (2) location of. and respect for, the angular vein.

Surgeons who are not accustomed to perform this small operation should remember that the crest of the lachrymal groove and the internal tarsal ligament constitute two landmarks, strict attention to which will render success easy and certain.

R. H. E.

KOPKE (Ayres). **Les troubles oculaires dans la maladie du sommeil.**—*Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 139-146.

It is suggested in this paper that the lesions of the optic nerve, so commonly found after the injection of atoxyl for the treatment of sleeping sickness, should be attributed to the trypanosome infection rather than to the atoxyl, and that the drug merely liberates the endotoxins from the parasites in the neighbourhood of the nerves ; it is suggested that a local reaction is produced in this way and that the nerves suffer in consequence.

The author may be right or he may be wrong in his contention, but the fact remains that the use of atoxyl is dangerous to sight, since it is quite likely to induce an atrophy of the optic nerves.

R. H. E.

KIRKPATRICK (Henry). **The Etiology of Primary Cataract.**—*Brit. Med. Jl.* 1922. Mar. 25. pp. 467–468.

This paper suggests that all forms of primary cataract may have a common constitutional cause. If the cause is only active for a limited period, the cataract is likely to be a non-progressive one, *e.g.*, punctate, lamellar cataract, etc. ; if, on the other hand, the action is continuous, the result is the production of a progressive cataract (presenile or senile).

The different conditions which are recognized to be associated with primary cataract are enumerated, and most of these are found injuriously to affect the endocrines, or to be accompanied by disturbances of that system. It is remarked that the diet of Indians, amongst whom cataract is so common, frequently is not only deficient in essential food factors, but is also badly balanced ; this condition reacts deleteriously upon the endocrine glands. More local causes, such as exposure to injurious heat and light rays and the existence of an uncorrected error of refraction, are likely to determine the formation of a cataract in the eye of a person who is predisposed to a degenerative change in his lens fibres by reason of a constitutional defect.

R. H. E.

SMITH (Henry). **The Earliest Stage of Senile Cataract.**—*Lancet.* 1922. Feb. 4. pp. 223-224.

The difficulty of arriving at any conclusion regarding the cause of the disease is mentioned. The inhabitants of the North-West of India, in whom cataract is specially prevalent, are well nourished ; the fact that they are wheat eaters constitutes the chief difference between them and other Indians among whom the incidence of the disease is less.

Failing distant vision is stated to be the earliest symptom of cataract, and good results are claimed from the subconjunctival injection of a 1 in 4,000 solution of cyanide of mercury when the vision has not fallen below 6-10.

R. H. E.

WRIGHT (R. E.). **Keratomalacia in Southern India.**—*Brit. Jl. Ophthalm.* 1922. Apr. Vol. 6. No. 4. pp. 164 175.

In this very interesting paper the literature of experimental and of human keratomalacia is first reviewed, and the type of the disease met with in Southern India described, and its causation and treatment fully discussed.

In the course of the investigation a group of patients were fed on a mixture of yolk of egg, fruit juice, butter and raw meat juice, in addition to their ordinary diet. A liberal allowance of fat-soluable A was thus ensured. A similar group were treated on the ordinary lines with cod liver oil and the usual mixture of chlorides of calcium, sodium and ammonium. Each of these groups showed an equal improvement, and the rapidity of recovery was no greater in one than in the other.

Wright concludes (1) that the disease is a complex generalized disorder in which the liver, thyroid and intestine play an important part, and (2) that it is practically always associated with deficiencies in the dietary of a general type. It does not appear to correspond to experimental keratomalacia or xerophthalmia, due to deprivation of fat-soluble A, nor does it respond in the same way to the administration of a diet rich in this food essential. The chief measures in the treatment are general care of the eyes and of the intestinal tract, and the administration of cod liver oil, liver, thyroid extracts and salts.

The deleterious effect of a deficiency of vitamins in combination with an excess of carbohydrates in the diet, as pointed out by McCARRISON, should be borne in mind when considering the aetiology of this disease.

R. H. E.

MIRONESCO (Th.). **Paralysie périodique de l'oculo-moteur provoquée par les accès de fièvre récurrente.**—*Presse Méd.* 1922. Jan. 7. Vol. 30. No. 2. p. 17.

The case is related of a patient who suffered from a paralysis of his left oculomotor nerve during an attack of relapsing fever. The paralytic symptoms appeared during the first onset of the fever, disappeared during the intermission and reappeared during the relapse.

Mironesco suggests that the paralysis may be the result of a small haemorrhage in the oculomotor area, or of the presence of spirilla in the capillaries of the same area.

R. H. E.

SERGENT (Edm. & Et.). **Quatrième campagne antiophtalmique en milieu indigène algérien (1920).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. I. No. 3. p. 336.

The prophylactic measures against the seasonal epidemics of ophthalmia, previously carried out in 1914, 1917 and 1919, in Algeria, were continued in 1920 and were much appreciated by the population. A 1 per cent. solution of silver nitrate is instilled in all cases of conjunctival inflammation ; inspections are carried out and the treatment is applied by the inspectors engaged on antimalarial duty. One hundred and thirty-seven cases were treated during July and August, 1920.

R. H. E.

GANGULY (S. K.). **A Case of Herpes Zoster Ophthalmicus.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 211–212. With 1 plate.

HARMAN (N. Bishop). **A Direct Record Scotometer for Investigating the Central Field of Vision.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 335–336.

SÁNTOS FERNÁNDEZ (J.). **Trachoma in the Tropics.**—*Gac. Méd. de Mexico.* 1921. Aug.–Dec. Vol. 1. 4th Ser. No. 7. 1st Half. p. 419. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Sept. 10. Vol. 77. No 11. p. 897.]

REVIEWS AND NOTICES.

KREDIET (G. J.). **Over het voorkomen van Protozoëncysten en ontwikkelingsvormen van Coccidiën in den darm van mensch en enkele dieren.** [On the Occurrence of Protozoan Cysts and Developmental Stages of Coccidia in the Gut of Man and some Animals.]—Proefschrift, Leiden. 1921. 8vo., pp. x + 62. With 1 plate. (Boek en Steendrukkerij Johannes Jesse, Amsterdam.)

This is a dissertation, in Dutch, presented to the University of Leyden for the degree of Doctor of Medicine. It comprises four chapters, preceded by a short introduction and followed by a brief postscript. A folding plate (eight figures in half-tone, from good photographs) completes the work.

Chapter I contains a short summary of the literature dealing with the intestinal protozoa of man and domestic animals—considered chiefly from a standpoint which the author terms "epidemiological." This adjective seems hardly apposite, however, since the author's real object was evidently to make a comparative study of the intestinal protozoa of man and those of the commoner domestic animals, with a view to ascertaining any possible relations which might exist between them. This first chapter is well and clearly written, but contains nothing that needs to be specially noticed here. The author's own contributions to the subject are contained in the next two chapters, which form the greater part of the work—the final chapter being a short summary and discussion of his findings.

In Chapter II the author describes his methods and records the results of his protozoal census of the intestinal contents of human beings, rats, oxen, horses, pigs, sheep, rabbits, and guinea-pigs. He confined his attention chiefly to cysts. Human material was obtained from patients in the University Hospital at Leyden. The animal material consisted partly of fresh faeces passed *per anum* and partly of the intestinal contents of slaughtered beasts. It was obtained from the animal house belonging to the Laboratory of Comparative Pathology at Leyden, and from the town slaughter-yard. Rats (species not stated) were obtained (dead) from the local sanitary authorities.

The following table summarizes the results obtained from the examination of human beings. Altogether 100 persons were studied—men, women, and children—and the author ascertained by personal inquiry that none of them had ever been in any tropical or subtropical country. It is not stated whether any of them had ever been abroad, though it is noted (p. 2) that the majority had never been outside their native province (South Holland).

Total number examined = 100.

Infected with	Men.	Women.	Children.
Entamoeba histolytica	6	1	0
"*E. tenuis*"	7	1	1
E. coli	18	8	4
Endolimax nana	15	7	3
Iodamoeba bütschlii	10	2	1
Giardia intestinalis	7	5	3
Chilomastix mesnili	3	2	0
Number examined	60	28	12

"*Entamoeba tenuis*" is the name used by the author to denote those strains of *E. histolytica* which form small cysts—according to the interpretation of the reviewer and other English protozoologists. The original table is not given in the above form, and some of the names of the protozoa have been altered by the reviewer. [The original contains eight pages of further details of these cases, with a long tabular summary (three pages)—far too detailed for reproduction here.]

The findings from the animal investigations are given somewhat fully, but may be briefly summed up as follows :—

1. RATS. Number examined = 20. *Entamoeba muris* found in 2, " Limax cysts " in 8, " *Lamblia intestinalis* " in 2, " other flagellates " in 4.

2. OXEN. Number examined = 50. " *Amoeba limax* " cysts found in all. Amoebic cysts " with 4 *limax* nuclei (? *Endolimax nana*) " found in 1, Coccidia in 35, " Cysts of a flagellate " in 3.

3. HORSES. Number examined = 20. " *Amoeba limax* " cysts found in 2, Coccidia (? *Eimeria zürni*) in 10, " Cysts of a flagellate " in 2.

4. PIGS. Number examined = 50. " *Amoeba limax* " and " 4-nucleate limax-cysts (? *Endolimax nana*) " in 48, *Entamoeba* sp., with cysts, 12–18μ in diameter, in 2, *Lamblia* cysts in 2, " other flagellates " in 9, Coccidia (? *Eimeria jalina*) in 11.

5. SHEEP. Number examined = 25. " Cysts of *Amoeba limax* and 4-nucleate cysts like those of *Endolimax nana* " found in all. Cysts " very like those of *Lamblia intestinalis* " in 1, " other flagellate cysts " in 1. Coccidia (*Eimeria faurei*) in 2.

6. RABBITS. Number examined = 20. Cysts of " *Amoeba limax* " in 8, *Eimeria stiedae* in 16.

7. GUINEA-PIGS. Number examined = 20. " *Amoeba limax* " cysts found in 3.

The findings in pigs, and in sheep and oxen, are especially noteworthy. It is unfortunate that the author gives no real indication of what he means by the loose term " *Amoeba limax*," and neither describes properly nor figures the cysts of " *Endolimax nana* " found in pigs, sheep, and cattle, nor the *Entamoeba* found in the pig. A further account of all these is much to be desired.

Chapter III contains a fuller account and discussion of the coccidia found in ungulates. The unusually high percentages of infection with these parasites in all the animals examined are emphasized, the author noting that they may be partly accounted for, perhaps, by his technique (concentration method of BAYER—see this *Bulletin*, Vol. 19, p. 625). He specially notes, also, that the coccidia were all found in healthy full-grown animals. He provisionally identifies the oocysts found in oxen and horses as those of *Eimeria zürni*, those in sheep as *E. faurei*, and those in pigs as *E. jalina*. In his postscript he takes note of the recent work of DOUWES (*Trop. Vet. Bulletin*, Vol. 10, p. 103) and disputes the validity of the name *E. debliecki* introduced for the coccidium of the pig by this worker. Its proper name, he considers, is that which he himself employs. [The name " *E. jalina* " is probably invalid. KREDIET has not, unfortunately, traced it to its source, and he cites no authority for it—having merely copied it from NEVEU-LEMAIRE. According to BRUMPT (*in* CAUCHEMEZ (1921), *Bull. Soc. Path. Exot.*, xiv, p. 646) the " *Coccidium* " to which PERRONCITO originally gave the name " *jalinum* " was in reality a *Blastocystis*. See also NIESCHULZ (1922), *Centralbl. f. Bakt.*, I Abt. (Orig.), lxxxviii, p. 379.]

In his final chapter the author points out, *inter alia*, that he has found *E. histolytica* in no animal but man. He found, indeed, a species of *Entamoeba* in pigs, but its cysts were invariably uninucleate. [Probably *E. suis* Hartmann.] The " *Lamblia intestinalis* " found in rats, pigs, and sheep is apparently regarded by the author as identical with *Giardia intestinalis* of man ; but while he is confident that species of *Endolimax* occur in rats, cattle, sheep, and pigs, he hesitates to identify any of these as yet with *E. nana*. [The reviewer notes as curious the alleged occurrence of " Iodine cysts " (= *Iodamoeba*) in no less than 13 per cent. of human cases, but their entire absence from pigs. The apparent absence of *Trichomonas* from rodents also seems to him remarkable.]

It may be added that the occurrence of eggs of various intestinal worms, in the animals examined, is incidentally recorded.

[This dissertation merits the careful attention of all workers engaged in the study of intestinal protozoa—an attention which, unfortunately, it is not likely to receive, owing to the manner of its publication. It is to be hoped that the author, who evinces unusual ability, will continue his work, and will ultimately publish it in greater detail in some readily accessible journal.]

Clifford Dobell.

BIJLSMA (U. G.). **Onderzoek naar het voorkomen van darmprotozoën bij Nederlanders.** [An Investigation into the Occurrence of Intestinal Protozoa in Natives of Holland.]—Proefschrift. Amsterdam. 1919. 8vo. pp. x + 95. 4 plates. (Boek- en Kunstdrukkerij G. J. Willemse, Utrecht.)

This work is a dissertation submitted to the University of Amsterdam some three years ago for the M.D. degree. It contains information of much interest to those English workers, both at home and abroad, who have been engaged of late years in studying the occurrence and distribution of the intestinal protozoa of man.

The author—mainly inspired, apparently, by the observations of English protozoologists during the War—set out to make a careful survey of the intestinal protozoa occurring in the inhabitants of Holland. He intended originally (the investigations appear to have been begun in 1917) to ascertain what intestinal protozoa occur (1) in persons returning to Holland from the tropics, and (2) in natives of Holland who have never been in tropical countries; but the carrying out of the first part of the programme was prevented by the War, and consequently he was forced to confine his attention to the second part. His material consisted of stools obtained from Dutch troops (belonging apparently to the Colonial Reserve, garrisoned at Nymegen), and from a few interned Belgian soldiers. Altogether he examined 200 cases—192 Dutch and 8 Belgian. None of these men had been in the tropics; but it is not recorded whether any of them had been abroad, or in subtropical lands. At the time of writing the author was not acquainted, of course, with the final results of similar work done in England (see this *Bulletin*, Vol. 18, p. 33), though the earlier findings in this country were known to him; and somewhat strangely he barely mentions the observations published in Holland by KUENEN some six months earlier (this *Bulletin*, Vol. 17, p. 3).

The dissertation contains five chapters, besides a brief Introduction; the subjects dealt with in the chapters being, in order, "The intestinal protozoa found in man," "Material and methods," "Morphology and diagnosis of the human intestinal protozoa," "Results of the [author's own] investigations," and concluding "Reflexions." The first three chapters contain matter of a more or less introductory character, that dealing with the protozoa themselves (Chapter III) being, in many ways, the least satisfactory. In it the author describes and discusses various intestinal protozoa previously recorded—to the number of which he happily does not propose to add—and illustrates his remarks with three plates of 56 figures. This chapter contains numerous statements—taken, it is true, for the most part from the works of others—which are undoubtedly erroneous. A fair number of recent works on the subject are cited, but the references are not always correct, and many important papers have been overlooked. It is clear, moreover, that the author is not very familiar with the science of Protozoology, while on questions of nomenclature his knowledge and judgement are frequently at fault. As instances of such shortcomings the following—selected at random from many noted—may be given. On p. 9 (Chapter I) only five references are given at the foot, though no less than 17 works are referred to, by implication, in the text—without bibliographic indication; and, moreover, of the five references actually given, the first is downright wrong, and the second and third are incomplete (wanting year of publication and volume number respectively). On p. 27 it is stated that red corpuscles in the body of an *E. histolytica* can be recognized by their green hue—an assertion which is surely true for colour-blind people only. On p. 52 it is wrongly stated that the coccidia hitherto found in man belong to species which are proper to rabbits and oxen. On p. 45 the author objects to the name *Dientamoeba*, but naively remarks that he will leave the selection of " a better name " for this organism until its " biology " is better known ! Other passages which reveal a lack of acquaintance with the rules of nomenclature could also be quoted. But it is unnecessary to mention all the errors and inaccurate statements which can be detected in this chapter, though they are not to be ignored, since they show that the author is by no means an infallible authority on the subject of which he treats, and that his diagnosis, therefore, cannot always be accepted without reserve.

In Chapter IV the author's findings are given in detail. Briefly they were as follows :—

Number of cases examined = 200.

Infected with	No.	Per cent.
Entamoeba histolytica	22	11
E. coli	53	26·5
" *E. tenuis* "	34	17
Endolimax nana	16	8
Iodamoeba bütschlii	28	14
Giardia intestinalis	15	7·5
Chilomastix mesnili	7	3·5

No other protozoa were found by the author in his Dutch and Belgian cases ; but it may be noted that he also records a case of infection with *Dientamoeba fragilis* in a person who had formerly resided in the tropics. The very high rate of infection with *Iodamoeba*—recorded as " Iodine cysts "—is noteworthy, and raises a doubt as to whether the diagnosis was always correct in the case of this organism. " *E. tenuis* " is the amoeba regarded by English workers as a strain of *E. histolytica* which forms small cysts ; and consequently, if the diagnosis was not at fault, the total rate of infection with *E. histolytica* is—on this interpretation—no less than 28 per cent. The author attempts to justify the view that *E. tenuis* is a separate species, but his reasoning does not carry conviction. One of his plates shows a number of curves constructed from the dimensions of the cysts of *E. histolytica*, *E. coli*, and " *E. tenuis*." They differ, however, from similar curves previously published (by the reviewer and others) chiefly because they are based for the most part upon numbers which are too small to give satisfactory statistical results (only 100 cysts were measured in most cases).

The figures given above, for the series of 200 cases, are based upon a variable number of examinations per case—some patients having been examined only once, but others twice, thrice, four times, or five times. Moreover, some cases were examined in the usual way, others after concentration of the cysts in their stools by two different methods (Cropper and Row, Bayer). It is thus impossible to form a close estimate of the true rate of infection with any of the organisms recorded. The results of the examinations are given in full, and occupy—together with other particulars of the cases—nearly 15 pages ; the total findings being then summarized in a table extending over 10 further pages. Much interesting information can be extracted from these sections.

In the final chapter the author discusses his findings and compares them with those of some other workers. He reaches the conclusion that the figures obtained for Dutch soldiers are probably also applicable to the general population of Holland, but that certain sections of the community—*i.e.*, those engaged in " dangerous " occupations (sailors, fishermen, bargees, miners, etc.)—are more subject to infection than those who pass their lives in hygienic surroundings. He has now proved, he says, that intestinal protozoa do occur in the inhabitants of Holland,

and that all kinds which occur commonly in the tropics occur likewise in a considerable proportion of the resident Dutch population. In this respect he believes the conditions in Holland to be similar to those which obtain in England, and he urges that, while *E. histolytica* should be included among the causes of disease in his native land—not merely in her tropical possessions—yet treatment, directed towards the eradication of infections, is necessary only when infection is accompanied by clinical symptoms of disease. In general, his conclusions are in agreement with those of English investigators.

This dissertation contains much other information of interest to workers on the subject with which it deals, though it has not hitherto received the attention which it merits from other workers (including the reviewer); but for this unfortunate circumstance would-be readers can hardly be blamed, since the method of publication has effectively rendered the work almost inaccessible to all save a favoured few of the author's fellow-countrymen.

Clifford Dobell.

The Practice of Medicine in the Tropics. Edited by BYAM & ARCHIBALD. Vol. II.

In the review of "The Practice of Medicine in the Tropics, Vol. 2," which appears in the July number of the *Bulletin*, the following remarks are made (p. 538):—" The parasite of malignant tertian malaria is placed in the genus *Laverania*. SCHAUDINN long ago pointed out that a difference in shape of the gametocyte was hardly sufficient ground for a generic distinction, and this is the opinion of the reviewer."

It has been suggested that this passage is likely to mislead.

In the chapter on the Parasites of Malaria, under Section V, Systematic Position and Affinities (page 1543), the position of the authors in regard to the parasite of malignant tertian is quite clearly stated. Recognizing that there may be differences of opinion in attaching specific or generic value to any particular distinguishing character or group of characters, they give a choice of alternatives, one or other of which they consider is called for in order to more sharply separate the malignant from the other two types. They give their reasons for the advisability of such separation under three headings, and " a difference in shape of the gametocyte " is not one of these.

In their choice of nomenclature the authors adopted the course followed in most recent works dealing with the malarial parasites (MANSON-BAHR, CASTELLANI & CHALMERS, ZIEMANN).

As a detail referring to a minor matter to which the reviewer alludes in another connexion, it may be pointed out that he substitutes the term " pore " for the words " opening or rupture " used by the authors.

TROPICAL DISEASES BUREAU.

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TROPICAL OPHTHALMOLOGY: A REVIEW.

By Lt.-Col. R. H. ELLIOT, M.D., F.R.C.S., I.M.S. (retd.),
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Trachoma must occupy a prominent place in any retrospect of work done in connexion with those diseases of the eye that are of special interest to the practitioner in the Tropics. It must be confessed that no dramatic solution of the problems connected with the aetiology, pathology and treatment of the disease has been arrived at yet.

It is of interest to note that some writers on the subject suggest that a large number of probably widely different conditions may, at the present time, be included under the convenient term " trachoma." This applies even to the cicatricial stage of the disease. The suggestion seems reasonable enough. To illustrate the point—we are aware that the same cause is not active in every case of cirrhosis of the liver, or of broncho-pneumonia, or even of general septic peritonitis; on the contrary, the characteristic changes in these organs may result from the reaction of the tissue cells to various kinds of irritation; similarly it is quite possible that the conjunctiva may react in an apparently identical fashion to a variety of infections.

Negroes are sometimes stated to enjoy an immunity to trachoma, but ROY (1920) has found the disease to be very common amongst the blacks of Northern Africa; destructive types of the disease, too, were found to be just as common amongst these as amongst the other races.

NICOLLE and CUÉNOD (1921) have conducted a research upon experimental trachoma in animals. They were able to reproduce the disease in the chimpanzee, in which it ran a course similar to human trachoma. Many of the monkeys proved resistant, but the Algerian baboon (*Macacus innuus*) was found to be susceptible and to be quite as satisfactory as the chimpanzee for the purpose of experiment. Their experiments suggest that flies play an important part in the propagation of trachoma. They consider that the disease is due to an invisible micro-organism, which can pass through a Berkefeld V filter, and that the signification of Prowazek's corpuscles is doubtful.

SOLOVIEF (1921), working on experimental trachoma at Tunis, has concluded that Prowazek's corpuscles are derived from products which are the result of degeneration of the cell nucleus and that they have a real value in diagnosis. LUMBROSO (1921) suggests that they represent an aetiological factor in a specific conjunctival infection which is very frequently associated with early trachoma, and that a mixed infection is present when they are found in a trachoma patient. He found the corpuscles very abundant in all stages of non-gonorrhoeal ophthalmia neonatorum, and considers that this may be the specific infection in question.

A considerable number of papers dealing with the treatment of trachoma have appeared. Some of the measures recommended are modifications of older methods. The great value of the combined excision of HEISRATH appears to be more generally appreciated. The relief afforded by this operation in the middle stages of the disease is nearly always very striking. STAICOVICI and LOBEL (1920) recommend prolonged grattage with a cube of sugar which has been dipped in alcohol; the application is followed by the formation of a false membrane. RUSH has found glycerite of boroglycerine a useful addition to the drugs in ordinary use. DIMITRY (1921) massages the tarsal plate over a stout copper rod. The tarsus is compressed between the rod, placed in the superior fornix, and the thumb. An indurated tarsus can be made pliable in this way. ABBOUDY (1920) claims to have obtained good results from the method of galvanopuncture recommended by ABADIE. KIRKPATRICK (1921) has drawn attention to the value of a thorough stretching and exposure of the transitional conjunctiva by the injection of a syringeful of saline beneath it. Thorough applications to the membrane are thus facilitated, and if a little anaesthetic is added to the saline, they are also rendered painless. DAVID (1920) has had very striking success in the prophylaxis of trachoma, and of other forms of conjunctivitis, by the daily instillation into healthy eyes of a 1 per cent. solution of sulphate of zinc, to which is added 5 per cent. of 1 in 1,000 adrenalin chloride solution.

SERGENT (1921) states that prophylactic measures taken against ophthalmia in Algeria have been very successful. The services of the inspectors employed on antimalarial measures are employed; these use instillations of 1 per cent. nitrate of silver in the case of those who are affected by any conjunctival inflammation or discharge.

The great part played by dust and glare in the production of conjunctival inflammation has been very strikingly shown by SICHEL (1921). This writer, when investigating an epidemic of ophthalmia in Christmas Island, made a study of the meteorological records of the past fourteen years, and was able to demonstrate that the hospital admissions for ophthalmia during the same period were in excess during bright, dry weather, whilst they fell to zero when the weather was wet and cloudy.

COMBERG (1920) has reported the occurrence of a severe epidemic of conjunctivitis which was caused by contamination of the water in a well-cared-for swimming bath in Berlin. MACCALLAN and BEATON (1920) have described the peculiarities of the gonococcal conjunctivitis met with in Egypt. They state (1) that the infection is commonly derived from another conjunctiva; (2) that it is frequently subacute or chronic; and (3) that it is a less virulent disease than that met with in Europe. This is undoubtedly correct. KIRKPATRICK (1920*b*) advocates the use of strong solutions of magnesium sulphate as a local application in cases of gonorrhoeal ophthalmia, as well as in the secondary infections of trachoma and in suppurative conditions of the cornea and eyeball. McPherson (1920) has described the types of conjunctivitis artefacta which he met with in the Mesopotamian Expeditionary Force.

A curious form of subconjunctival granuloma has been met with in Central China by McAll (1920). Tumour-like masses, free from inflammation, grow between the eyeball and the lids. By degrees the conjunctiva and the lids are themselves involved, and the masses bulge forward very markedly. The bulk of the tumour is composed of lymphocytes. (Kirkpatrick has seen almost identical appearances in the palpebral and bulbar conjunctiva of a Hindu woman in Madras. Both eyes were affected. In this case the mass histologically resembled amyloid, but failed to exhibit the staining reaction of amyloid; the absence of cells and new-formed vessels was very striking.)

A case of ocular sparganosis is reported from Annam by Motais (1918). The tumour was the size of a bean, and had been accompanied by occasional attacks of redness of the eyes and oedema of the lids.

Pacheco-Luna (1920) has drawn attention to the presence of eye lesions due to an infection by the filarial nematode, *Onchocerca volvulus*. The infection occurs in Guatemala and causes tumours of the skin, known there as "Coast Erysipelas"; the eye lesions are dependent on these, and vary from a condition similar to the superficial punctate keratitis of Fuchs to a severe iridocyclitis. Treatment of the ocular condition is useless until the skin tumours have been removed.

An epidemic in Madras of a peculiar form of macular keratitis has been reported by Kirkpatrick (1920*a*). The disease is similar to the forms described by Herbert and by Westhoff. Its chief characteristic is the extraordinary lack of pain and the vascular reaction associated with it.

Macrae (1921) has described a corneal affection met with amongst the natives of South Arabia. A little group of glassy nodules was found to occupy an area in or below the equatorial corneal meridian. The changes were unaccompanied by any vascular reaction and iritis was absent.

Wright (1922*a*) has very fully discussed the problem of keratomalacia as found in Southern India. He considers that the disease is a complex, generalized one, in which the liver, thyroid and intestine play an important part; it is practically always associated with deficiencies in the diet of a general type. Chlorides of sodium, calcium and ammonium, codliver oil, liver, and thyroid are all important remedies. Codliver oil is quite indispensable. Many patients are unable to digest codliver oil when given by the mouth and inunctions of the oil should then be used. It is unnecessary to draw attention to the importance of administering similar treatment to the nursing mother of a baby affected by keratomalacia. Blake (1921) has reported the occurrence of proptosis, caused by an intra-orbital haemorrhage in infantile scurvy. The cause of the condition may readily escape recognition; in one case, at least, it was thought to have been due to "rheumatism." The lids and the subconjunctival tissue were unaffected.

Wright (1922*b*) has met with a case of *Rhinosporidium kinealyi* of the lachrymal sac, and also some cases of the same disease affecting the conjunctiva. The latter are of special interest, as the condition was discovered almost accidentally in the course of a routine examination of a school. He has made the very important observation that a collyrium of 2 per cent. tartar emetic was effective in causing the disappearance of the polypi. If the drug is found equally effacacious in the treatment of rhinosporidium of the naso-pharynx, many patients will be saved much suffering and inconvenience.

ROY (1920) has examined 418 negro sufferers from sleeping sickness, and states that 19 of them were suffering from optic atrophy caused by the injection of atoxyl or a similar drug. These figures are an indication of the danger incurred by the use of such drugs. KOPKE (1922) suggests that the optic atrophy is caused by the liberation of endotoxins owing to the destruction of trypanosomes by the atoxyl rather than by the direct action of the drug. The patient, however, might regard this as being merely of academic interest.

A considerable number of cases of blindness due to quinine poisoning have been reported. These afford ample proof of the danger to sight which results from the use of heroic doses of quinine. Most writers now consider that the drug causes loss of vision by its toxic influence on the retinal cells as well as by its action upon the retinal arteries. It is probable that the retinal cells are rendered more vulnerable to toxic influences by the interference with their blood supply.

WOOD (1920) has remarked an inability to stand sunlight and an inability to read in many patients who had suffered from malaria. The accommodative power of these patients appeared to be diminished, and convex glasses of a dioptre, or sometimes more, were needed for reading. The symptoms of photophobia lasted for about a week, but it was about a month before the accommodation fully recovered. Similar symptoms were observed after influenza ; in this case recovery was more slow. The interference with accommodative power as a result of any debilitating influence is well known, and it is possible that we need look no further than this for the explanation of the above observations.

BARRAQUER's method of removing the lens in its capsule has attracted a considerable amount of attention and has impressed some observers. The removal by traction of the lens in its capsule must necessarily cause less disturbance of the vitreous body than its expulsion by pressure on the globe, and, in the hands of an experienced operator, is therefore likely to give better results than the ordinary intracapsular expression by SMITH's technique. The apparatus is, however, somewhat complicated, and a surgeon, working in remote parts, might find it difficult to keep the delicate mechanism in proper working order. It must be recognized that this operation requires just as much skill for its successful performance as any other form of operation for cataract. The reviewer has seen Professor BARRAQUER at work and can testify to the extraordinary skill he displayed, and to his absolute sincerity ; but he was far from obtaining the impression that the new method will be a success in the hands of a large number of ophthalmic surgeons. Indeed, he feels strongly that no one should attempt it until he has acquired facility with the older and simpler method of extraction.

Many surgeons now use a " bridge conjunctival flap." The section is made as if it was intended to form an ordinary conjunctival flap ; this flap, however, is not completed, but is left attached at its scleral extremity. A bridge of conjunctiva, connecting the corneal and scleral lips of the wound, is thus formed. The lens can be delivered and manipulations can be carried out beneath the conjunctival bridge. Accurate adaptation of the edges of the wound is ensured during healing and this technique has great advantages in many cases, especially in very old people. It is, however, sometimes a little more difficult to effect the delivery of the lens when this flap is used (a dark, flat nucleus is specially likely to cause trouble), and care should be taken to make the section rather larger than usual.

WRIGHT (1921), working on the same lines as VAN LINT and VILLARD, has found that blocking of the facial nerve by novocaine—in order to cause a relaxation of the orbicularis—is very useful in patients who appear likely to squeeze their eye violently during an operation for cataract.

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—— (1922*a*), xix, 714.
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* References are to summaries in the *Tropical Diseases Bulletin.* Dates in parentheses refer to year of publication of original papers.

PLAGUE.

i. ARMSTRONG (W. G.). **The Present Plague Outbreak in Sydney.**—*Med. Jl. Australia.* 1922. May 20. 9th Year. Vol. 1. No. 20. pp. 546–552.

ii. FERGUSON (E. W.). **The Plague Epidemic.**—*Ibid.* pp. 552–554. With 8 text figs.

i. The first outbreak of plague in Sydney was in 1900; 300 persons were attacked and the mortality was 34 per cent. Of the patients admitted to hospital 71 were treated with the Roux-Yersin serum; the mortality among this number was 24 per cent.

The first intimation of the outbreak described by these authors was a statement in the Sydney press on September 15, 1921, that a death from plague had occurred in Brisbane on August 23. There were no further developments until September 19. In the afternoon of that day six dead rats were found beneath the cargo in No. 4 hold of the *Wyreema*, just arrived. One of these rats was infected with plague. The others were too putrid for examination. After fumigation a large number of dead rats were sent to Dr. Armstrong; 11 were infected with *B. pestis*. They were all black rats. On September 22 a grey rat (*R. norvegicus*) caught on the wharf was found to be infected. Thirty-eight infected rats were taken in business premises near the A.U.S.N. wharf and one case of human plague occurred in the same area. The infection spread to Sussex Street and to the Paddington area. Sixteen cases of human plague are described. They were treated with an antiplague serum, prepared in the Biological Institute of Australia, with very satisfactory results. Of the 16 cases, two died before they could be removed to the Coast Hospital; a third reached the hospital moribund and died two hours later. A fourth case was not diagnosed until convalescence had set in, and so was not sent to hospital. Of the remaining 12, one mild case did not receive any serum. Ten patients treated with the serum recovered and one died.

ii. The text figures in Dr. Ferguson's paper show: *B. pestis* in a smear from a bubo and a specimen of bacilli from a culture, *Ctenocephalus felis*, *C. musculi*, *P. irritans*, *X. cheopis*, and a microscope slide showing the proventricular valve of *C. fasciatus*. Of 15 cases all but two gave *B. pestis* in smears or cultures. In five cases the findings were confirmed by animal inoculations. Serological tests were made in six cases, and in four the blood serum of the patient agglutinated the *B. pestis*. In rats the disease takes the form of septicaemia with, or without, a bubo. Buboes were stated by the Indian Plague Commission to be present in 85 per cent. of the rats examined and to be most frequent in the cervical region.

J. H. Tull Walsh.

URIARTE (Leopoldo). **Un trabajo sobre la peste de Oriente en el Uruguay.** [A Work on Plague in Uruguay.]—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. Sept. & Oct. Vol. 27. No. 5. pp. 233–242.

This paper is itself of the nature of a description or résumé of a previous work entitled "History of Bubonic Plague in Monte Video," by Dr. ESPIRO, Director of the Monte Video Health Department. He states that the ship *Highland Prince*, from Antwerp and London, arrived there in October, 1900, having had five cases of plague on board, and stupefied or dead rats. Soon afterwards dead rats were seen at the Customs House of Monte Video, and in January, 1901, an overseer was taken ill with bubonic plague and died. Three more cases occurred that year, and until 1910 a few cases arose each year. During the succeeding five years there were 96 cases, with 39 deaths. Isolation and disinfection were the measures carried out; but little attention was given to rat destruction, as that was regarded as waste of time and money.

The author points out that plague epidemics rise and die down, and the people, thinking that it has disappeared for good, express surprise and fear when fresh cases occur, and are under the impression that there has been a reintroduction, whereas it has been maintained among the rats. He, therefore, is of opinion that all the cases have in reality come from the first importation more than twenty years ago, and that, instead of closing down the railways and stopping traffic, it would be better to institute a rat campaign.

[This paper illustrates and emphasizes the importance of thorough rat destruction in a ship that has once had plague on board. There are rat "carriers" as well as human "carriers."—J. H. T. W.]

H. Harold Scott.

DE FARIA (José Alberto). **Casos de peste em Lisboa em 1920.**—*Med. Contemporanea.* 1921. Sept. 18, 25 & Oct. 2. Vol. 39. Nos. 38, 39 & 40. pp. 297–303, 305–309 & 313–318.

In October, 1910, plague was introduced into Lisbon from the Azores by a ship's stoker. The disease spread and was not stamped out till June, 1911. There were, the author states, "some tens of cases" in all, mostly of a benign type, the few deaths occurring among the early cases. The existence of an epizootic among rats was established. In 1914 there was a fresh outbreak, 10 cases occurring, with 9 deaths, eight of the fatal cases being of pneumonic type. In March, 1915, 4 cases occurred, all fatal. In December, 1916, and June, 1917, the disease appeared again, the number of cases being respectively 3 with 1 death and 13 with 4 deaths. No further cases occurred until October, 1920, when there was a fresh and much more serious outbreak—114 cases with 34 deaths, among the latter being 10 cases in which the patient was found dead in his home untreated. No evidence of reimportation could be found to account for the successive outbreaks, and the author is of opinion that the explanation is to be found in a continuing epizootic among rats. During the 1920 epidemic 64 cases came under the author's treatment, which he classifies as follows, according to type: Bubonic 60, Septicaemic 2, Mitis 2. Serum treatment was tried extensively with serum obtained from the Pasteur Institute in Paris and from that at Berne. In both cases the results were disappointing.

F. S. Arnold.

VAN LOGHEM (J. J.). **Huisrat en pestbestrijding in de 17de eeuw.** [House Rat and Combating of Plague in the Seventeenth Century.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. No. 13. pp. 1275–1279.

Prof. Van Loghem cites from an old French book on plague (Pieces diverses de differens auteurs concernant les remèdes et les precautions publiques et particulières qu'on peut prendre contre la peste; et la conduite chrétienne que l'on doit garder dans les tems de contagion),

which appeared at Marseilles in 1721 and contains reprints of seventeenth-century publications. It appears once more that rats were numerous in those days and were a definite menace to grain stocks, and that rat corpses were reckoned to belong to the regular household refuse. Rat corpses were commonly found during cleaning of plague houses, whilst it may be presumed that the methods recommended in the same book for killing of rats by fumigation were not very efficacious. The rat corpses may therefore have been those of plague rats.

The conditions in the seventeenth-century houses, where the walls were covered with straw mats, etc., the author thinks, strikingly resemble those in the plague houses he saw in Java.

Though direct proof of the relation between rat plague and human plague in former epidemics cannot be given, the intimate contact between man and rat in those days suggests such a relation.

W. J. Bais.

RIGOLLET (L.). **A propos de l'épidemiologie de la peste.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 502–506.

Refers to the necessity for destruction of rats and to the value of prophylactic anti-plague vaccination. The author states that :—

> The opinion is anchored in the mind of the people of Senegal that one must not " vaccinate " during an epidemic because vaccination is followed by a dangerous phase of sensitization. This opinion is unfortunately exploited by the opponents of protective inoculation. [This has been perhaps due to want of a satisfactory vaccine in Senegal.] It is not forbidden to hope that a good vaccine will be found in the near future. I desire that on that occasion our preventive action, which should be rapid and in massive doses, shall not be interfered with by a spirit such as that which I have noted.

Dr. Le DANTEC agreed with the author. Dr. LEGER said :—

> I do not pretend that anti-plague vaccine confers an absolute immunity unlimited in duration. There is no vaccine which attains this ideal standard. At the moment I am experimenting concurrently with the aqueous vaccine made by the Institute of Biology of French West Africa and a new vaccine. This is the lipo-vaccine prepared by Le MOIGNIC. . . . It contains 5·0 mgm. of microbes per cc., say four to five thousand million germs at least. Subcutaneous injection of 1·0 cc. is well borne and rarely gives any reaction. The future will tell us its prophylactic value.

J. H. T. W.

KIAMIL (Mehmed). **Étude sur la peste des vaccinés.**—*Bull. de l'Administration sanitaire des Frontières.* 1922. Mar. 20. No. 12. pp. 257–260.

The author had charge of 111 cases of plague, eight of whom had been vaccinated with an anti-plague vaccine prepared at the Bacteriological Institute, Constantinople. It contained 750 million dead germs :—

No. 1, vaccinated once, 16 days before plague broke out.
„ 2, „ twice, 23 „ „ „ „ „
„ 3, „ once, 6 months „ „ „ „
„ 4, „ once, 15 days „ „ „ „
„ 5, „ twice, 1 year „ „ „ „
„ 6, „ once, 6 months „ „ „ „
„ 7, „ once, 3 „ „ „ „ „
„ 8, „ once, 1 year „ „ „ „

The clinical signs and the course of the malady were very different among these vaccinated cases from what was seen in the unvaccinated. Among the former no deaths occurred; but of 103 unvaccinated, 51 died (49·5 per cent.). The reduced severity of the symptoms and local lesions renders diagnosis more difficult among the inoculated, and in many cases it can only be decided by bacteriological examination. In the uninoculated the bacillus is generally found in smears which have been stained, and cultures are generally successful. In the vaccinated patients it was rare to find the bacillus; here and there one might be seen; cultures also were less frequently positive. It is noticed also that suppuration of buboes does not occur as frequently among vaccinated patients as among the uninoculated. Only three out of the eight protected persons showed signs of suppuration.

J. H. T. W.

PICCININNI (Francesco). **Il contagio della peste alla luce di un recente episodio di peste in Italia.** [The Contagion of Plague in the Light of a Recent Outbreak in Italy.]—*Ann. d' Igiene.* 1922. Apr. Vol. 32. No. 4. pp. 264–276.

Traces infection to the usual cause, viz.: infected rats entering Naples in boats trading with plague-infected areas. These rats passed on the infection to the rats of the Port of Naples. The author next describes investigations into immunity in rats in an infected area. He inoculated 40 rats (*M. decumanus*) from the Port of Naples, 40 from a large mill at Taduccio, and 20 from the town of Naples. Of the 80 from the port and the mill 64 seemed immune. Of the 20 taken in the town all died. Infection through grain and its derivatives is alluded to, and the author believes that the plague bacillus may be present in the grain. The following table is given:—

TABLE II.

Rat Examination in the Port of Naples, 1921.

——	Rats captured.	Rats found dead.	Found Infected.		
			M. musculus.	*M. rattus.*	*M. decumanus.*
Jan.–Mar. ..	1,140	19	—	—	—
Apr.–June ..	1,932	3	—	—	—
July–Sept. ..	2,597	134	68	46	20
Oct.–Dec. ..	2,157	507	31	1	—
			99	47	20

The usual preventive measures were instituted.

J. H. T. W.

PICCININNI (Francesco). **Le difficoltà della diagnosi batteriologica della peste in alcuni casi di eccezione.** [Difficulty of Bacteriological Diagnosis in Exceptional Cases of Plague.]—*Ann. d'Igiene.* 1922. Apr. Vol. 32. No. 4. pp. 277-280.

Having noted that the usual methods of diagnosing plague supply *B. pestis* from the bubo, with confirmation by culture and pathological reaction in guinea-pigs, the author points to the difficulty of isolating the bacillus when mixed—in the buboes—with other germs and to a similar difficulty in what he calls pestis minor. He describes cases which were clinically plague but in which he failed to find the bacillus under the microscope and in which the inoculated guinea-pigs gave no reaction. Some of the cultures were positive, but when injected into guinea-pigs showed reduced virulence.

J. H. T. W.

DELBREIL (P.). **De quelques constatations necropsiques en rapport avec la clinique dans la peste pulmonaire primitive.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Apr. Vol. 2. No. 4. pp. 94-106.

As the result of the author's observations in 32 post-mortem examinations of persons dying from plague pneumonia, he finds that the condition of the lungs is one of broncho-pneumonia with small patches of hepatization, generally at the base. Pleural effusion was general with few adhesions. In some cases there was little more than a general congestion. Dr. Delbreil found pericarditis with effusion, which, as he says, does not appear to have been previously noticed. During life the sputum rapidly became blood-stained. During the discussion Major NOGUE remarked that failure to diagnose pneumonic plague was often excusable and that cases had been sent to hospital in Dakar as ordinary bronchitis. The plague bacillus was readily isolated. The expectoration is very variable. Sometimes the patient dies before any appears; generally the characters are typical: reddish or greenish jelly or muco-purulent spotted with blood. In two cases there was haemoptysis. Dr. HECKENROTH stated that the coccobacillus could always be obtained from the sputum.

J. H. T. W.

COLLIGNON. **État actuel de la prophylaxie et du traitement de la peste.** —*Arch. Méd. et Pharm. Milit.* 1922. Apr. Vol. 76. No. 4. pp. 451-463.

[The early part of this paper repeats facts already noticed: this *Bulletin*, Vol. 16, p. 43 (MONZIOL and COLLIGNON); see also FICHET, Vol. 17, p. 390.]

Vaccines.—Collignon reports that the vaccine prepared at the Pasteur Institute, dose 1·0 cc., gives immunity, but that it is better to give a second injection, after four or five days, of 2·0 cc., and even a third injection of anti-plague vaccine, 4·0 cc. The immunity thus conferred lasts about five months, and where plague is epidemic vaccination should be repeated every six months. Infants may be protected by injections of 0·5 cc.; these injections with five-day intervals.

Serum Vaccination.—The immunity conferred by anti-plague vaccine is delayed for several days, and for that reason the inoculated should be protected from any chance of infection. To overcome this difficulty, CALMETTE and SALIMBENI inject a mixture of anti-plague serum and anti-plague vaccine: 5·0 cc. serum on one day and 2–3·0 cc. vaccine on the following day. BESREDKA has prepared a sero-vaccine without excess of the serum: this is an emulsion of plague bacilli killed at 60° C. in physiological saline to which a strongly agglutinating, non-heated serum is added. The deposit is decanted, made into an emulsion with saline and heated at 54° C. Dose for injection, 5·0 mgm. of the sensitized bacterial bodies.

Preventive Sero-therapy.—Where it is necessary to act quickly serum alone may be used for prophylaxis; dose from 10·0 cc. to 20·0 cc. subcutaneously. The immunity thus conferred lasts about eight days.

Treatment.—The first efforts to prepare a serum were made by ROUX, YERSIN, CALMETTE and BORREL in 1895. The serum may be injected subcutaneously or into the veins, the latter method being the most satisfactory. It should be given as soon as possible and continued until a curative effect is seen.

SIMOND has given the following figures for Hindus: those treated on the first day had a mortality of 20 per cent.; those treated on the third day, 36 per cent.; fourth day, 66 per cent.; if only on the fifth day, the mortality was 100 per cent. 100 to 150 cc. should be injected subcutaneously or 80 to 100 cc. intravenously for the initial dose; subsequent doses will be based on the condition of the patient. The maximum amount which has proved curative varies. CALMETTE and SALIMBENI used 320 cc.; DORIZA, .600 cc.; CASTEL and LAFONT injected as much as 1,140 cc. in six doses.

CHOKSY, in Bombay, proved the value of anti-plague serum: the death-rate among 200 cases so treated was 63·5 per cent. Among 200 cases of equal gravity not treated with serum it was 73·8 per cent. [*cf.* MCCOY and CHAPIN, this *Bulletin*, Vol. 16, p. 430.]

J. H. T. W.

i. BONREPAUX. **Note sur un cas de peste septicémique avec ictère. (Observation clinique et autopsie.)**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. July. Vol. 3. No. 17. pp. 115–117.

ii. BAUS. **Quelques chiffres sur le début de l'épidemie de peste actuelle.**—*Ibid.* pp. 112–114.

i. Describes at length a fatal case of plague with pleural and peritoneal effusion and acute degeneration of the liver. The man, aged 28, was admitted to hospital on July 5, 1921, and died the next day at 7 a.m. Numerous plague bacilli were found in the lungs and liver.

ii. Statistics of an epidemic already noted [see this *Bulletin*, Vol. 19, p. 367 (Plague in Dakar)].

J. H. T. W.

BRITES (Geraldino). **Sur un cas d'amygdalite pesteuse primitive.**—*C.R. Soc. Biol.* 1922. May 13. Vol. 86. No. 17. pp. 1044–1045.

The case described is that of a man found dead in the street. The post-mortem examination revealed severely congested and inflamed tonsils, with marked sanious oedema passing into the pharynx and down into the lungs. Spleen and liver were implicated. The lymphatic glands of the neck and chest, groin and axilla were not affected. Bacteriological examination was made and the tissue of one tonsil inoculated into a guinea-pig, which died between the third and fourth day. In the spleen of this animal *B. pestis* was found. Sections of the other tonsil were made in which the plague bacillus appeared in large numbers.

J. H. T. W.

FORGUES. **L'hélio-chromothérapie. Ses applications en médecine d'armée. Ses résultats dans le traitement du bubon pesteux.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. Oct. Vol. 1. No. 3. pp. 15–27.

Describes the general technique employed and gives details of a case of bubonic plague in which the open buboes healed rapidly under the influence of red light. The patient had been in hospital from January 11, 1918, and the sores were indolent when the coloured light treatment was begun in June.

J. H. T. W.

i. MANSOOR (Ram). ii. SIMPSON (W. J.). **Bubonic Plague treated with Neo-Salvarsan.** [Correspondence.]—*Brit. Med. Jl.* 1922. July 22. pp. 127–128; July 29. p. 190.

i. The case reported is that of a young man, about 22, with a painful bubo in the left groin, the fluid from which proved positive for *B. pestis*. He was seen by Dr. Mansoor on May 11, three days after the onset of the disease; temperature 104° F. At 3 p.m. of that day 0·45 gm. neosalvarsan in 10 cc. distilled water was injected intravenously, with 0·5 cc. pituitary extract given subcutaneously. The same evening the temperature began to fall and the symptoms (headache, sinking feeling and restlessness) began to abate. On May 15 the temperature was 100° F.; on the 16th it was normal. The bubo was treated by applications of belladonna and glycerine. [It is hardly correct to say that " we have no reliable serum for curative treatment " of plague. Reference to the volumes of this *Bulletin* will supply information as to the use of anti-plague serum which may be obtained in India.]

ii. Professor Simpson rightly says that such a statement as that made by Dr. MANSOOR " is apt to do an immense deal of harm, because anyone reading it who has not had experience of the great value of Haffkine's prophylactic in outbreaks of plague would likely conclude that the inoculations are not only useless but also dangerous." The mishaps to which Dr. MANSOOR refers happened 20 years ago, and were due to a faulty bottle of vaccine. Dr. Simpson's testimony is of considerable value, owing to his knowledge of plague in India. He writes: " For populations exposed to infection of bubonic plague and living under crowded and insanitary conditions, my experience is that inoculation with Haffkine's prophylactic is one of the quickest and most powerful weapons we at present possess . . . and that it is quite harmless provided proper precautions are taken in its application."

J. H. T. W.

LEGER (Marcel) & BAURY (A.). **Pestis minor expérimentale des rats blancs.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 506–509.

The strain of *B. pestis* used, " Konaté," came from a human case of plague and was cultivated since May, 1921, on agar. Injected subcutaneously or rubbed into the mucous membrane of the nose and mouth, it killed white rats and shrews, the latter living, generally, a day or so longer than the rats.

J. H. T. W.

NEGRONI (P.). **Avantages de la préparation du sérum antipesteux d'après la méthode Lustig-Galeotti.**—*Bull. de l'Administration sanitaire des Frontières.* Constantinople. 1922. Feb. 5. No. 9. pp. 161–167.

In this method the nucleo-protein endotoxin of the plague bacillus is extracted and then employed to immunize the horse. It is claimed that the serum obtained has the same value as an anti-plague vaccine prepared by injections of living or dead bacilli, while it excludes any possible infection due to working with *B. pestis.*

The plague bacillus is cultivated on agar at 37° C. After 24 hours the colonies are washed off with 0·3 per cent. solution of caustic potash—about 40 cc. for each Petri dish. The emulsion thus obtained is left at 37° C. for about 10 hours, during which time the liquid becomes mucilaginous and opalescent. It is next rendered acid, with 1 per cent. acetic acid, until floccules of precipitated nucleo-protein appear. This precipitate is allowed to settle, centrifuged, decanted and washed with sterile distilled water. The precipitate is then placed in sterile capsules and dried in a vacuum. The dried nucleo-protein will, according to LUSTIG, retain its properties for several years. The initial dose employed to immunize the horse is 0·005 mgm. dissolved in 1 per cent. solution of carbonate of soda. For each cc. of solution, 2·5 mgm. are taken; the solution is added little by little, with trituration in a mortar.

A bibliographical index is given at the end of the article.

J. H. T. W.

BOMBAY. **Report of the Bombay Bacteriological Laboratory for the Year 1920.** [HODGSON (E. C.), D.S.O., D.P.H., D.T.M. & H. (Camb.), I.M.S.]—9 pp. 1922. Bombay: Government Central Press. [Price 3 annas.]—Part I.

[For notice of Report for 1919 see this *Bulletin,* Vol. 17, p. 395.]

The total number of doses of anti-plague vaccine issued during the year was 1,468,729. A table shows the number of cases that occurred during an epidemic in Mombasa and the number of inoculations carried out each week. As in previous years, a large number of rats were examined and the percentage infections are tabulated.

J. H. T. W.

i. LEGER (Marcel) & BAURY (A.). **Essai de vaccination contre la peste par la voie buccale.**—*C.R. Soc. Biol.* 1922. July 8. Vol. 87. No. 25. pp. 444–446.

ii. NOC (F.). **Vaccination contre la peste par la voie buccale. A propos de la note de Leger et Baury.**—*Ibid.* July 15. No. 26. pp. 493–494.

i. The authors report experiments on a monkey, a rabbit, and a guinea-pig (with controls) which seem to favour the view of an acquired immunity against plague when an animal, sensitized orally with ox bile, is given doses of anti-plague vaccine by the same route. [These experiments are interesting ; but this method is not fully proved and is unlikely to supersede the ordinary method of anti-plague vaccination.]

ii. The author made experiments in oral " vaccination " at Dakar (Senegal) in 1921, using an oil-vaccine containing plague bacilli killed by heat. It seemed that this method gave uncertain results and that any immunity conferred was of very brief duration.

J. H. T. W.

LUISI. **A propos du sérum de Yersin.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. June. Vol. 2. No. 6. pp. 158–167.

Dr. Luisi describes graphically the serious symptoms which followed upon the prophylactic injection of 5 cc. of Yersin's serum : urticaria, oedema of face, vomiting, etc., with some fever. During the discussion Major NOGUE remarked that in 1919 he received an injection of 20 cc. of anti-plague serum ; he also suffered from urticaria with rise of temperature and faintness and pain. These symptoms lasted three days, after which he recovered. Major ABATUCCI recorded similar but milder symptoms in his own case. Other instances are given of grave reaction after inoculation with Yersin's anti-plague serum. The author insists that all persons " vaccinated " should be warned that such untoward symptoms may appear. It is necessary to rest for some time after the injection and to avoid alcohol. In some instances the serum itself may be defective.

J. H. T. W.

i. NEVEU-LEMAIRE. **Les grandes endémo-épidémies intercoloniales : la peste.** —*Presse Méd.* 1922. May 31. Vol. 30. No. 43. pp. 893–898. With 3 text figs.

ii. SINISI (Guido). **Di un' Epidemia pestosa in Somalia. (Agosto-Novembre 1921.)**—*Giorn. di Med. Milit.* 1922. July. Vol. 70. No. 7. pp. 326–330.

iii. DE GOYON (J.). **L'épidémie de peste de Tamatave (Février–Avril 1921).**—*Ann. d'Hyg. publique et de Méd. légale.* 1922. March. 4th Ser. Vol. 37. No. 3. pp. 137–156.

iv. DELBREIL (P.). **Vaccination antipesteuse.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. Nov. Vol. 1. No. 4. pp. 13–26.

v. THOULON & FORGUES. **L'abcès de fixation dans la peste.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Jan. Vol. 2. No. 1. pp. 4–23.

vi. HORNABROOK (R. W.). **Plague Experiences.**—*Med. Jl. Australia.* 1922. Apr. 15. 9th Year. Vol. 1. No. 15. pp. 408–410.

vii. SMILLIE (W. G.). **Bacillos semelhantes ao da peste encontrados nos ratos da cidade de São Paulo.** [Bacilli resembling *B. pestis* found in Rats in San Paulo City.]—*Ann. Paulist. Med. e Cirurg.* 1921. Sept. & Oct. Year 9. Nos. 9 & 10. pp. 161–165.

viii. CLEMOW (F. G.). **Des formes cliniques de la peste.**—*Bull. de l'Administration sanitaire des Frontières.* Constantinople. 1921. Oct. 5 & 20, Nov. 5 & 20 & Dec. 5. Nos. 1, 2, 3, 4 & 5. pp. 1–8 ; 17–28 ; 39–44 ; 57–61 ; 73–77.

i. A compiled history of plague epidemics with map of distribution. Figures of rats and of three fleas, *X. cheopis*, *C. fasciatus* and *P. irritans*, are given.

ii. Describes an epidemic and the sanitary and prophylactic measures employed. Contains nothing new.

iii. A paper describing in detail the epidemic already noticed, see this *Bulletin*, Vol. 19, p. 370.

iv. The author discusses anti-plague vaccination in various aspects and concludes in its favour.

v. A long paper followed by an inconclusive discussion on the value of counter-irritation or "fixation" abscesses, with, or without, the use of anti-plague serum.

vi. A paper read at a meeting of the Victorian Branch of the British Medical Association. Interesting, but does not contain anything new.

vii. Already noticed under CINTRA (A. P. de Ulhôa), this *Bulletin*, Vol. 18, p. 349, and Smillie (Wilson G.), Vol. 17, p. 398.

viii. An article published in New York and in Constantinople in 1900.

J. H. T. W.

CLEMOW (F. G.). **La peste, le choléra, le typhus exanthématique en Turquie et dans les pays limitrophes en 1920 et1921.**—*Bull. de l'Administration sanitaire des Frontières.* Constantinople. 1922. Apr. 5, 20, & May 5. Nos. 13, 14 & 15. pp. 275–279; 295–299; & 315–318.

PULGHER (F.). **Die Anwendung der Thermopräzipitationsreaktion bei der Pestdiagnose und der Agglutination zur Bestimmung pestverdachtiger Stämme.** [Thermo-precipitation Test in Diagnosis of Plague and Recognition of Strains by Agglutination.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol 26. No. 6. pp. 165–175.

CHOLERA.

MACKIE (F. P.), with TRASLER (George). **Laboratory Records from Mesopotamia. No. III. Cholera.**—*Indian Med. Gaz.* 1922. Apr. Vol. 57. No. 4. pp. 121–125.

A somewhat belated account of laboratory work done in 1916 and 1917. With reference to infection from fruit, the authors' conclusions were :—

"1. The inside of fresh, unruptured fruit is sterile.

"2. The reaction of melons and tomatoes is strongly acid, and of cucumbers is mildly acid, at all stages of ripening.

"3. The temperature of these fruits is lower than that of the external atmosphere by :—

13·89° F. (7·7° C.) in the case of the melon.
15·98° F. (8·8° C.) ,, ,, cucumber.
6·01° F. (3·34° C.) ,, ,, tomato.

"4. The cholera vibrio can be recovered from melons seven days, and from cucumbers and tomatoes three days, after they have been inoculated."

J. H. Tull Walsh.

SANARELLI (G.). **De la pathogénie du choléra (sixième mémoire) ; le " choléra intestinal " des jeunes chiens.**—*Ann. Inst. Pasteur.* 1922. May. Vol. 36. No. 5. pp. 386–398.

——. **Patogenesi del colera (VIa Memoria). Il " colera intestinale " nei giovani cani.**—*Ann. d'Igiene.* 1922. May. Vol. 32. No. 5. pp. 349–361.

[For previous memoirs see references, this *Bulletin*, Vol. 17, p. 401.]

The experiments described in this memoir refer to the action on *V. cholerae* of the blood-serum, the gastric juice and the succus entericus of puppies. The action of the serum of the adult dog is always vibriocidal and that without regard to age or race. If 1 cc. of serum is added to a suspension of vibrios in physiological salt solution, the vibrios are killed at the end of one or two hours. On the other hand the serum of newly born puppies has, like that of newly born rabbits, no bactericidal power. Nevertheless the vibriocidal property of the serum shows itself sooner in young dogs than in young rabbits. The gastric juice of puppies prevents the onward passage of living vibrios. The succus entericus collected from a loop of intestines is not a favourable culture medium for *V. cholerae.*

J. H. T. W.

MASAKI (S.). **Du mécanisme de l'infection cholérique et de la vaccination contre le choléra par la voie buccale.**—*Ann. Inst. Pasteur.* 1922. May. Vol. 36. No. 5. pp. 399–415.

The author has repeated the work of BESREDKA, SANARELLI, and others—using guinea-pigs and rabbits for his experiments. His conclusions are :—

1. Vibrios injected into veins, into the peritoneal cavity, or even subcutaneously, are mostly recovered in the intestines.

2. The rabbit and guinea-pig are refractory to any dose of vibrios given by the mouth.

3. Bile given by the mouth increases the action of the cholera endotoxin in the intestines [and, apparently, inhibits the action of the gastric juice].

4. Ingestion of living or dead vibros is not followed by the appearance of antibodies.

5. The rabbit alone, sensitized with bile, reacts to vibrios given by the mouth.

6. Only the sensitized animal, after pathological troubles set up by the ingested vibrios, becomes " vaccinated " against a dose which would otherwise be fatal.

7. The immunity acquired is probably local in the intestine.

J. H. T. W.

BAUMGARTEN (W.). **Die intraperitoneale Cholerainfektion und der Pfeiffersche Versuch bei der Maus.** [Intraperitoneal Cholera Infection and the Pfeiffer Test in Mice.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. Vol. 93. No. 1. pp. 87–95.

A long paper of experiments on mice. The results show that serum does not protect and that complement is less marked in mice than in guinea-pigs. The work of SANARELLI and others makes it unnecessary to comment at length on these experiments.

J. H. T. W.

PLATZ (Camilla). **Zur Frage der Veränderlichkeit von Vibrionen.** [The Variability of Vibrios.]—*Ztschr. f. Hyg. u. Infektionskr.* 1922. Vol. 95. No. 3. pp. 365–369.

This is a critical paper dealing with the transformations of vibrios as observed and reported by KUHN (Ph.). The cultured strains are placed direct with the agar on the cover-glass and after removal of the agar are stained with " Giemsa." By this method KUHN observed certain morphological changes. For the first hour typical " commas " are seen ; then threadlike forms appear which increase and form a network. These KUHN called B-(bacteria)forms. After a time granules appear in the B-forms which are not stained red by Giemsa in fresh preparations. Other forms seen by KUHN were : D-(dendritic), A-(amoeboid) and C-(coccoid). Platz has found involution forms also. [These forms of the cholera vibrio have been long known. In Calcutta D. D. CUNNINGHAM found that they differed with the culture medium.]

J. H. T. W.

KODAMA (Toyojiro). **[Contribution to the Knowledge of the New Specific Medium for *V. cholerae*, together with a Critical Review of Aronson's Medium.]**—*Eiseigaku Densembyogaku Zasshi* (*Jl. of Hyg. & Infect. Dis.*). 1922. Feb. Vol. 17. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1922. June 5. Vol. 2. No. 6. p. 176.]

[Refers to previous work, for which see this *Bulletin*, Vol. 19, p. 381.] This report deals with an improved method of preparing medium No. 3 :—

A. solution :	3 per cent. litmus neutral agar (with Witte's peptone)	100·0
	10 per cent. sodium bicarbonate solution	1·0
	Fuchsin saturated alcoholic solution	0·5
	Fresh 10 per cent. sodium sulphite solution	2·5

To the above is added 3·0 gm. Merck's soluble starch and the whole then boiled in the steam kettle for 20–30 minutes.

B. solution :	1/5 diluted bovine serum	100·0
	10 per cent. caustic soda	1·0

This solution is also boiled in the steam kettle. For use 2 parts of A. and 1 part of B. are mixed, sterilized for three days and used as a plate medium.

J. H. T. W.

i. KABESHIMA (Tamezo). **[On Para-Agglutination of the Cholera Immunized Rabbit's Serum.]**—*Nihon Biseibutsugakwai Zasshi* (*Jl. of Japan Microbiol. Soc.*). 1922. Jan. Vol. 16. No. 2. [Summarized in *Japan Med. World.* Tokyo. 1922. June 15. Vol. 2. No. 6. p. 173.]

ii. ——. **[Choice of the Immunological Reaction in the Diagnosis of *Vibrio cholerae*.]**—*Ibid.* [Summarized in *Japan Med. World.* Tokyo. 1922. June 15. Vol. 2. No. 6. p. 173.]

i. The author observed that a strain of *V. cholerae* isolated from several cases on H.I.M. Ship *Nissin* had developed two kinds of colonies, one thin and the other thick. By the use of the serum of the rabbit immunized with both strains, which was of high titre, they agglutinated. One was a true type *V. cholerae*, the other a paracholera vibrio.

ii. As in former epidemics in Japanese territory, the vibrios found in the epidemic of 1919–1920 contained more than one strain, and the author states that diagnosis must be made with sera suited to each strain.

J. H. T. W.

COHENDRY & WOLLMANN (E.). **Quelques résultats acquis par la méthode des élevages aseptiques : I. Scorbut expérimental. II. Infection cholérique du cobaye aseptique.**—*C.R. Acad. Sci.* 1922. Apr. 18. Vol. 174. No. 16. pp. 1082–1084.

This section deals only with Part II of this paper. The authors state that young guinea-pigs, which are aseptic as to the alimentary canal or contaminated by one germ only, viz., *Staphylococcus B-mesentericus*, when fed (at the age of 10 to 15 days) with one or two cultures of *V. cholerae*, show at the time of death (six to nine days after ingestion): a more or less hyperaemic intestine; caecum filled with fluid; and a pure culture of the vibrio, both from the gut and the blood. It is quite different with the controls, which are not aseptic, but fed with sterilized food. In their case the ingested vibrios disappear in 48 hours, or even in 24 hours, so that no cultures can be obtained. Is the difference due to the presence of, and the antagonism of, the usual intestinal flora in the controls? METCHNIKOFF believed that such was the case. Or, as SANARELLI thinks, does the presence of this flora render the intestinal mucous membrane more impermeable?

J. H. T. W.

ODA (Shunro). **[On the Biological Studies of** *Vibrio cholerae* **isolated from Cases in Cholera Epidemic that prevailed in China, Formosa, Korea and Japan in 1919, in Special Reference to the Types of Cholera Vibrios.]**—*Jikken Igaku Zasshi* (*Jl. of Experim. Med.*). 1921. Oct. Vol. 5. No. 4. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. pp. 81–82.]

Certain strains developed a haemotoxin [as already recorded, see this *Bulletin*, Vol. 17, p. 406, WATANABE, etc.; also Vol. 18, p. 353, DOUGLAS (S. R.)]; otherwise they agreed with other vibrios isolated by the author.

J. H. T. W.

KAMIMURA (Yukiaki) & TSUDA (Katsusuke). **[On the Incubation Period of Cholera.]**—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*). 1921. Oct. Vol. 20. No. 10. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 79.]

During an epidemic in 1920 the authors noticed that the incubation period was very short, especially among women and children. In most cases the period [not always easy to fix] was three days. The shortest incubation period was five hours, the longest 11 days.

J. H. T. W.

MUTERMILCH (S.). **L'épidémie du choléra dans l'armée polonaise en 1920–1921.**—*Ann. Inst. Pasteur.* 1922. Apr. Vol. 36. No. 4. pp. 287–304. With 1 map in text.

The infection was introduced from Russia by the Red Army. There were 877 cases:—

Prisoners of war	835
Polish soldiers	42

with 490 deaths. Among the civil population there were 114 cases with 57 deaths. The epidemic did not show anything new. The anti-cholera vaccine used in the Polish army contains also *B. typhosus*, *B. paratyphosus* A and B.

J. H. T. W.

SEALY (G. O. F.). **The Treatment of Early Cases of Cholera with Volatile Oils.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 10. pp. 918–919.

Employing 40 minim doses of a mixture containing 12 or 15 minims of the oils of cajeput, aniseed and juniper, together with tincture of cinnamon, alcohol, ether and sulphuric acid, the author has successfully treated several cases of cholera, two in Baghdad and nine in the Indian Station Hospital, Ferozepore.

J. H. T. W.

CHATTERJEE (Lal Mohan). **Statistics of the Treatment of Cholera Cases by a Modified Method of Sir Leonard Rogers, as carried on at the Mayo Hospital.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. p. 10.

The modification referred to consisted in giving an alkaline injection (Soda bicarb. ʒij, Water Oj) before using intravenous injections of hypertonic salt solution. Between March and June, 1921, 97 cases were thus treated; 77 recovered and 20 died.

J. H. T. W.

OHKURA (Tatsuwo). [**On the Respiration of Cholera Patients under the Influence of Sodium-Bicarbonate Saline Solution which has been injected into the Vein.**]—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*). 1921. Oct. Vol. 20. No. 10. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 79.]

The author records that the beneficial effect of the saline injections was seen in the improvement of respiration and pulse.

J. H. T. W.

YASUTOMI (Yoshihiro). [**On the Duration of Immunity in Cholera Vaccination.**]—*Namman Igakkwai Zasshi* (*Jl. S. Manchuria Med. Soc.*). 1921. Dec. Vol. 10. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 117.]

The author has proved by experiments [whether on animals or man during an epidemic is not stated] that the immunity produced by anti-cholera vaccination lasts for over a year and is as powerful as immunity due to an attack of cholera. [This, if confirmed, is of interest and value.]

J. H. T. W.

ORNSTEIN (Otto). **Ueber die Rolle der Tropine und Antitoxine bei der experimentellen Choleraimmunität.**—*Ztschr. f. Hyg. u. Infektionskr.* 1922. Vol. 96. No. 1. pp. 70–91.

Starting with the work originally done by PFEIFFER, the author reviews the nature and effects of the cholera poison. He refers to the haemolysing power of "El Tor" and other strains. Part II consists of a résumé of immunity produced by oral feeding, and a long table of experiments on guinea-pigs is given [*cf.* this *Bulletin*, MASAKI, Vol. 19, p. 383].

J. H. T. W.

i. DELAMARE (Gabriel). **Étude sur quelques cas de choléra observés à Constantinople en 1912-1913.**—*Bull. de l'Administration sanitaire des Frontières.* Constantinople. 1922. Feb. 20. No. 10. pp. 183–189; Mar. 5. No. 11. pp. 203–213.
ii. TSEN (Edgar T. H.). **The Bacteriological Diagnosis of Cholera.**—*Nat. Med. Jl. China.* 1922. Mar. Vol. 8. No. 1. pp. 22–34.
iii. DE PARTEARROYO (Francisco R.). **Un medio de cultivo para la diferenciación de los vibriones coléricos y seudocoléricos.** [A Culture Method for Differentiating *V. cholerae* from Pseudo-cholera Vibrios.]—*Arch. del Inst. Nac. de Hig. de Alfonso XIII.* 1922. Mar. Vol. 1. No. 1. p. 25.
iv. CRENDIROPOULO (Milton). **La question du paracholéra.**—*Bull. de l'Administration sanitaire des Frontières.* 1922. June 5 & 20. Nos. 17 & 18. pp. 353–356; 375–377.
v. SPRAWSON (C. A.), with Pathological Account by MUKHERJI (J. G.). **A Choleroid Epidemic in the United Provinces.**—*Indian Med. Gaz.* 1922. Jan. Vol. 57. No. 1. pp. 2-5. With 4 charts in text.

i. A detailed description of 100 cases of cholera.

ii. A paper read before the Fourth Biennial Conference of the National Medical Association of China, at Shanghai, February, 1922. Gives the usual methods employed in bacteriological diagnosis.

iii. A short paper referring to GORDON's method of distinguishing true cholera vibrios from so-called pseudo-cholera vibrios by estimating the amount of acid produced in a culture medium containing soluble starch.

iv. The author examines the literature of paracholera vibrios [see this *Bulletin*, Vol. 16, p. 37 (GREIG); p. 437 (JORGE)].

v. This epidemic, although presenting symptoms of a mild form of cholera, was apparently due to an organism allied to *B. paratyphosus* B. The bacteriological work leading to this conclusion is given in detail.

J. H. T. W.

BESREDKA. **De la vaccination contre le choléra.**—*La Médecine.* 1921. Dec. Vol. 3. No. 3. pp. 180–185.

GARAVAGLIA (Agostino).—**Sulla vaccinazione per via boccale contro il tifo, il colera e la dissenteria.**—*Policlinico.* Sez. Prat. 1922. Oct. 2. Vol. 29. No. 40. pp. 1296–1297.

KODAMA (H.). **Ein neuer elektiver Nährboden für Choleravibrionen.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Aug. 8. Vol. 88. No. 6. pp. 433–435.

MIYAKE (Moriji) **[A Contribution to the Biological Studies of the Agglutinogen of Cholera Vibrio.]**—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*). 1921. Oct. Vol. 20. No. 10. [Summarized in *Japan Med. World.* Toyko. 1922. Mar. 15. Vol. 2. No. 3. p. 79.]

NEGRONI (Pietro). **Sul valore dell' agglutinazione nella profilassi del colera.**—*Boll. d. Istituto Siero-terapico Milanese.* 1917. Nov. Vol. 1. No. 2. pp. 75-84. [Received Oct. 16, 1922.]

NEVEU-LÉMAIRE. **Les grandes endémo-epidémies inter-coloniales. Le choléra.** *Presse Méd.* 1922. June 28. Vol. 30. No. 51. pp. 1061–1067. With 1 map in text.

UNDULANT FEVER.

NICOLLE (Charles) & CONSEIL (E.). **Vaccinations préventives par voie digestive chez l'homme dans la dysenterie bacillaire et la fièver méditerranéenne.**—*Ann. Inst. Pasteur.* 1922. Aug. Vol. 36. No. 8. pp. 579–613. With 4 charts.

After discussing the value of prophylactic inoculation in general, and the recent method of BESREDKA for the immunization against typhoid by the ingestion of the vaccine, the authors point out how important it is to carry out the experiments on animals which can contract the disease and show symptoms more or less similar to those of man; also that no animal experiments are of such value as human.

They selected for trial two very dissimilar organisms—*B. dysenteriae* Shiga and *M. melitensis*, the former exerting its influence chiefly locally on the intestinal mucous membrane, the latter causing a septicaemia of long duration.

For the undulant fever tests they had a group of three men, natives of Tunisia, whose blood showed no agglutination reaction. Two of these were immunized by subcutaneous injections (two at seven-day intervals) of a vaccine made from five strains of *M. melitensis*; 14 days later all three were inoculated with a living culture; the two former suffered no ill effects, the control developed fever on the eighteenth day. This showed the protective value of the subcutaneous inoculations. A second experiment was carried out on three other men with the same strains. Two were given 100 milliards of the vaccine by the mouth on three consecutive days and again on the fifteenth day; neither digestive nor general symptoms followed; 15 days after the last dose they showed no agglutination reactions. They, with the control, were then inoculated with the living emulsion subcutaneously. The two vaccinated men were again immune, but the control developed the fever on the seventeenth day and from his blood the organism was recovered, after which he was cured with anti-melitensis vaccine, as was also the previous control. The blood of the immunized men in both series never showed any agglutinative power with any of the strains used. [This is a curious fact! How was it that the men inoculated with dead vaccine and again with living culture developed immunity and still had no agglutinins in the blood?]

The same satisfactory evidence of the advantage and efficiency of the alimentary method for immunization was obtained with *B. dysenteriae* Shiga.

P. W. Bassett-Smith.

BURNET (Et.). **Recherches sur la fièvre méditerranéenne.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. June. Vol. 2. No. 2. pp. 165–211. With 1 plate & 1 chart.

This is the first report of research at Tunis on undulant fever by the author, where opportunities for the study of this disease in man and animals are very favourable; and the author has given an extremely valuable record of his many interesting experiments and observations. It is divided into three parts: (1) on the infection in guinea-pigs; (2) in rabbits; (3) on the intradermal method for diagnosis; this with many of the other data has been already reported [this *Bulletin*, Vol. 19, p. 354.] His observations show that guinea-pigs and rabbits are easily infected with *M. melitensis*, but no fever analogous to that seen in man and monkeys is produced; the organism is rapidly eliminated from the blood but is found intermittently in the milk and urine; it tends to produce a chronic infection and is constantly found in the lymph glands, spleen and bone marrow; there is a great tendency to production of local abscesses from which the specific organism can practically always be isolated, and in the organs pseudo-tubercles are seen. Infection is rare in the newborn, and the young are rarely infected by the milk; they appear to have some hereditary immunity.

In 1915 the number of positive laboratory results in man began to go up, and the percentage of infected goats, which was 4·02 in 1909, rose in 1922 to 9·1, the Maltese goats in 1922 being the least instead of the most frequently affected. In infected goats the bacteriological and serological results varied very much from time to time, and it would seem, as stated by ZAMMIT, that an infected goat never recovers. The author emphasizes the fact that we know very little about the disease in goats, and that it is important to obtain information as soon as possible.

The paper should be read *in extenso* by all interested in the subject, and some reference to *M. paramelitensis* and *B. abortus* will be looked forward to at a future date, particularly with regard to the pyogenic effects of the different organisms.

P. W. B-S.

ROZIÈS (H.). **La fièvre de Malte dans le Haut Var.**—*Progrès Méd.* 1922. Mar. 25. No. 12. pp. 133–135.

In the Canton of Haut Var (S. E. France) goats abound and the milk is not boiled. It was therefore not a surprise to find undulant fever endemic; 12 cases were observed by the author. He notes especially, among the symptoms, sciatica without atrophy or loss of reflexes, enlargement of the liver and spleen, marked anaemia and asthenia. The duration of the fever is two to three months. He divides the cases into four groups: (1) hyperpyrexial (two cases); (2) ataxo-adynamic, mostly in the young; (3) haemorrhagic, with epistaxis, haematemesis, melaena, metrorrhagia, and purpura; (4) interminable. He states that 90 per cent. of the people drink goat's milk, and in 10 out of his 12 cases the milk used was not sterilized. The usual prophylactic measures were recommended. Quinine, camphor, pyramidon, methyl blue, collargol, and electrargol did not appear to shorten the disease. Vaccines are recommended but they must be used in large doses [amount not stated], gradually increasing every third day. [It is noticeable that in the 12 cases the symptoms were exceptionally severe and it is probable that there were milder cases which did not come under treatment.]

P. W. B-S.

ZAMMIT (T.). **Undulant Fever in the Goat in Malta.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 1–10. With 2 plates.

The incidence of melitensis infection in man at Malta since 1894 is commented upon. The beneficial results of the work of the Mediterranean Commission cannot be better described than in the author's words. "Before 1904 few of the employees of the Electric Telegraph Company, the dockyard, etc., or their families, escaped infection; but it is now an exception for a foreign resident, who takes the necessary precautions, to fall a victim to undulant fever. The bulk of the Maltese population, who thought that they knew better, have not heeded the caution repeatedly given out by the Sanitary Office as to the danger of using unboiled milk, with the result that there has been hardly any decrease in the number of cases of undulant fever." With regard to the goats, a table of infection from 1907 onwards shows that the average rate is 5 per cent., a dangerous proportion, as a single goat may infect hundreds of persons. The attempt to limit the disease by educating the people has been a failure, so that *the only prophylactic measure applicable is the destruction of all infected animals.* The immunization of the goats themselves by the method claimed by VINCENT [this *Bulletin,* Vol. 12, p. 378] as successful has not been effective in Malta. VINCENT's statement that "an infected goat recovers spontaneously after a period of time more or less long" is contrary to the writer's very long experience; he states that he has never known an infected goat to recover, the organism being always found on post-mortem examination in some of the organs. After kidding, a goat which has been infected but may appear to be perfectly healthy yields a milk teeming with melitensis.

[No mention is made as to the presence of *B. abortus* in goats at Malta.]

P. W. B-S.

STEPHENS (J. W. W.). **Undulant Fever in the Naval, Military and Civilian Populations of Malta.**—*Ann. Trop. Med. & Parasit.* 1922. Mar. 31. Vol. 16. No. 1. pp. 11–20. With 3 charts.

This paper is supplementary to that of ZAMMIT. Tables and charts are given showing the incidence of undulant fever in the naval squadron, the military garrison at Malta, and the civil population, from 1902

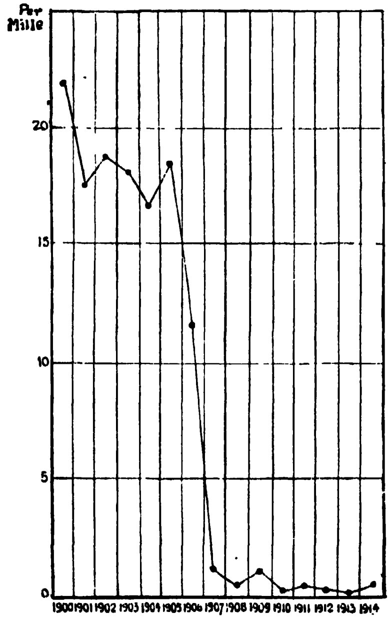

CHART I. Showing incidence of Undulant Fever in the Mediterranean Squadron. N.B.—One division of this scale represents 5 per 1,000.

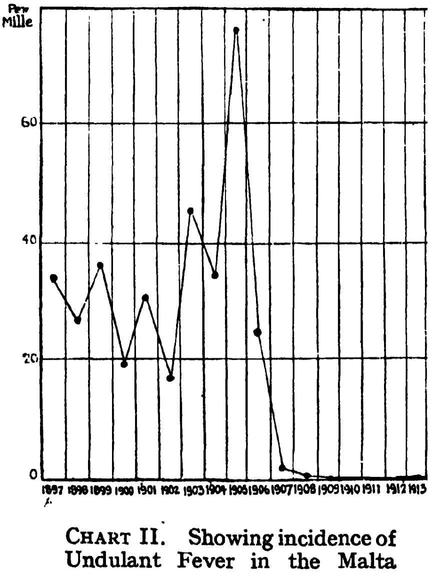

CHART II. Showing incidence of Undulant Fever in the Malta Garrison. N.B.—One division of this scale represents 20 per 1,000.

to 1919. In the services the fall was rapid and almost complete in 1906-7 after the infected milk was prohibited or boiled, whereas the incidence in the civil population remains about the same.

P. W. B-S.

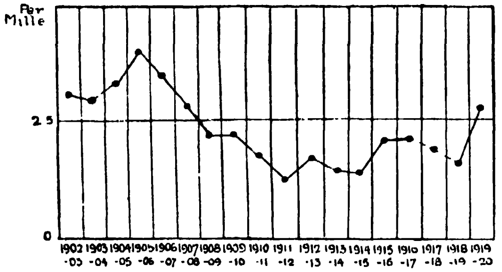

CHART III. Showing incidence of Undulant Fever in the Civil Population of Malta. N.B. — One division of this scale represents 2·5 per 1000.

[Reproduced from the *Annals of Tropical Medicine and Parasitology.*]

BANCE (J. E.). **Des modifications apportées par la fièvre méditerranéenne à la composition chimique du lait de chèvre.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. June. Vol. 2. No. 2. pp. 212–218.

In this investigation the goats whose milk was examined were divided into four groups: (1) healthy; (2) infected, but still good milkers; (3) infected, but only moderate milkers; (4) infected, and giving very little milk. The control bacteriological examinations were made by BURNET. The composition of the normal goat's milk was found to be a little different from that given by other authors, having a sp. gr. of 1028–30, casein 30 gm., lactose 50 gm. per litre, though less in the dry season, and ash 6·5–7·5. In the milk of the infected goats the most notable feature was the increase of the albuminous factor, proportionate with the presence of leucocytes. The sp. gr. rose from 1029–30 to 1033–35. The lactose varied very little, except when there was acute mastitis. Thus an infected goat, still a good milker, gives milk of a higher sp. gr. and higher albumen content; as the milk gets less in quantity the density and ash increase. When the udder is infected and hard the leucocytes increase in number, lactose is diminished, casein and ash are high. Inoculation with specific vaccine appeared to have no influence on lactation, either in healthy or diseased goats, but the experiments were too few to admit of absolute conclusions and they will be continued.

P. W. B-S.

BÉGUET (M.). **Existence simultanée de l'infection mélitensique chez l'homme et chez les chèvres dans un village.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Mar. Vol. 2. No. 1. p. 71.

Three cases of undulant fever occurred in a village of 1,200 inhabitants in Algeria. Investigation showed that out of 92 goats in the locality two which furnished milk for the sick were infected with *M. melitensis.*

P. W. B-S.

MARAIS (David P.). **Undulant (Malta) Fever in South Africa. An Appeal for its Study and for the Recognition of its Chronic Forms.**—*S. African Med. Rec.* 1922. Aug. 26. Vol. 20. No. 16. pp. 313–314.

The author is convinced that undulant fever in a chronic or latent form is endemic in the Union of South Africa, and that many of the cases pass unrecognized. He therefore appeals to medical men to give more care to the study of the disease, so that measures may be put in force both to prevent its spread and to study further its local etiology.

P. W. B-S.

COURCOUX (A.), LELONG (Marcel) & CORDEY. **Note sur un cas parisien de mélitococcie.**—*Bull et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 27. 38th Year. 3rd Ser. No. 25. pp. 1104–1110. With 2 charts.

The authors describe the case of a man suffering from a prolonged irregular type of fever, which lasted seven months. By a process of exclusion, and finally by positive serum and blood culture tests, this was proved to be undulant fever, due to an infection from handling goat skins in his daily work. The chief points of interest were the source of infection in a non-endemic area; the duration of the fever with the irregularity of the length of the waves of pyrexia, of which the shortest (the third) was four days, the longest and the last recorded 34 days (possibly not the last of the case); the severe lumbar pains early in the disease; the sweats and polyuria; the anaemia with low polynuclear count; and the marked emaciation.

An auto-vaccine was made and three injections were given of 150–500 million, but neither did these give rise to any local or general reaction, nor did they appear to improve the condition.

[These cases reported from regions far from the Mediterranean are very interesting and indicate the importance of excluding this disease in all cases of prolonged fever with a wavy temperature, associated with sweats, constipation, and emaciation—cases often bearing a strong resemblance to early tuberculosis. The vaccine treatment was not given a sufficient trial to admit definite conclusions as to its efficacy.]

P. W. B-S.

FIESSINGER (Noël) & BLUM (Gaston). **Fièvre de Malte à forme ambulatoire traitée par la vaccinothérapie.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 13. 38th Year. 3rd Ser. No. 24. pp. 1040–1045. With 1 chart in text.

The authors describe a case of slight but prolonged fever contracted in the south of France, with short but fairly regular undulations of pyrexia, attended with marked headache, anorexia, articular pains, sweats, enlarged spleen, and lassitude, during which, however, the patient carried on his usual work. On April 12, 1922, his serum gave a positive agglutination with *M. melitensis* to 1/200. On April 13 and 18 he was treated with a vaccine (from the Pasteur Institute); on April 20 the sero-agglutination had risen to 1/2000. The peculiar features of the case were the short periods of pyrexia (about three days), their regularity and complete intermission, and the curious fact that at each slight relapse after the vaccine had been given there was a painful reaction at the site of injection, analogous to the cutaneous reaction with filtered cultures described by BURNET.

In the discussion which followed the paper, M. HALBRON mentioned a case of four months' duration, in which a vaccine from the Pasteur

Institute and an autogenous vaccine had been given, but no local reaction as described above had been seen, though an injection given during a slight relapse was followed by a rather violent reaction with collapse, after which the fever ceased entirely, as if the disease had been arrested by a " shock " phenomenon.

[In the reviewer's experience of hundreds of cases treated with vaccine he has never seen the cutaneous reaction described.]

P. W. B-S.

ALFRED-COURY. **La vaccinothérapie dans la fièvre de Malte.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 6. Year 38. 3rd Ser. No. 23. pp. 998–1001.

In spite of the favourable results obtained by English and other clinicians the author concludes that vaccine therapy for undulant fever is more likely to do harm than good, provoking chronic cardiovascular changes or relapses of the fever. He divides cases treated into three groups: (1) favourable, in which the curative action of the vaccine is open to doubt, the disease itself running such an irregular course; (2) ineffective, comprising a large number of the cases; (3) actually dangerous. He quotes a single case treated with Parke-Davis vaccine. In support of his contention he quotes a guarded statement by Sir Almroth WRIGHT, that though vaccine should be tried it ought to be given with great care.

[The use and dangers of melitensis vaccine are well known, but there is no justification for condemning altogether what at times is a very important remedy. The reviewer has always discouraged the use of vaccine alone in very acute conditions of the fever.]

P. W. B-S.

GERBASI (E.). **Osservazioni e ricerche sul comportamento biologico e morfologico del micrococco di Bruce e del paramelitense.**—*Pediatria.* 1922. Apr. 1. Vol. 30. No. 7. pp. 289–296.

In his observations the author refers to the *M. pseudomelitensis* of ZAMMIT and the *paramelitensis* of NICOLLE. On culture media there were no morphological points of distinction from *M. melitensis*, but he states that the paramelitensis coagulates milk and ferments sugar. The paramelitensis serum agglutinated the strains of melitensis with which it was tested, but not to so high a titre as the paramelitensis organism. When grown outside the body these characters are well marked, but the strain can be brought back to give the normal reactions.

[It is most probable that the coagulation of milk was due to some contamination of the culture, as neither the reviewer's strains nor any other described do this.]

P. W. B-S.

BURNET (Et.). **Sur un type d'arthrite fréquemment observé chez les cobayes infectés par le** *Micrococcus melitensis.*—*C.R. Acad. Sci.* 1922. Apr. 3. Vol. 174. No. 14. pp. 973–975.

The experiments were made on guinea-pigs, which the author considers are satisfactory animals for the study of the disease. Of 100 guinea-pigs injected subcutaneously with *M. melitensis* 20 developed arthritis in 12 weeks, affecting the knees, wrists, and costo-chondral joints. Radiography showed true arthritis with rarification and decalcifiation of the bones. Pathologically there was osteomyelitis and inflammation of the soft parts round. The presence of *M. melitensis* was easily demonstrated; out of 12 tests 10 were positive.

Of 75 control animals, 2 had similar arthritis and their blood gave positive agglutinin reactions with the *M. melitensis* at 1/80 and 1/400. It is stated that these had been infected by indirect contagion. This high percentage of arthritis in animals is believed to explain the frequency of the complication in man. In infected guinea-pigs the organism is always present in the marrow of the long bones, and it is there that it should be looked for in man and goats when it is absent from the blood and milk.

P. W. B-S.

JAFFÉ (R. Hermann). **Ueber die experimentelle Infektion des Meerschweinchens mit dem** *Bac. melitensis* **(Bruce) und dem** *Bac. abortus* **(Bang).** [Experimental Infection of Guinea-pigs with *B. melitensis* and *B. abortus.*]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1922. Apr. 22. Vol. 238. No. 1. pp. 119–134. With 8 text figs.

The author first states that heavy doses or cultures of exalted virulence can produce severe or fatal infection in guinea-pigs, rats, and mice, and that after intraspinal or intravenous inoculations rabbits show emaciation, cramps, and haemorrhages, with perivascular infiltration of the central nervous system and degeneration of the cells. Though guinea-pigs are comparatively resistant, they may be spontaneously infected, for in two animals received from Malta, which had lived in goat houses, the serum gave positive agglutinations and the specific organism was cultivated from their organs. Other guinea-pigs inoculated with medium doses of this strain rapidly developed symptoms and died of coma, the males showing testicular changes. With small doses the animals lived 100–200 days.

B. abortus caused abortion in guinea-pigs and gave rise to definite symptoms with a mortality of 8 to 20 per cent. Histologically there was enlargement of the spleen in 98 per cent. and generally of the lymph glands and testicles.

The most important histological change in both is the formation of nodules in the liver, spleen, and other organs, made up of endothelial cells with oval nuclei deficient in chromatin, and giant cells. SCHROEDER produced similar changes in guinea-pigs by injecting raw cow's milk [was this tubercular?]. In the author's experiments the tendency to testicular implication was most definite with both the organisms and in very chronic cases these only were found. The large "clear cells" were first recognized in the infected testicles after six to eight weeks, mostly in the interstitial tissue, but they were seen to be passing into the tubules; they are phagocytic and are very characteristic, differing from those in tuberculosis in being less compact and less intensely coloured, and the nuclei are more separated. In the nodule they break down but there is no real necrosis of tissue. In abortus infection abscess formation is common, destruction of testicular tissue is slight, and is followed by recovery, whereas in melitensis infections the damage is more generally parenchymatous, without abscess formation, but the organ never recovers. Animals infected with *M. melitensis* showed fewer and smaller nodules than those infected with abortus; the qualitative changes are the same; these specific granulations are most abundant in the testicles, but are present and vary more in other organs and in the lymph glands. Subcutaneous, intraperitoneal, intravenous, intratesticular and intraovarian injections were given to the animals; the results were very similar but varied in degree; the diffusion of the nodular growths was very widespread and most marked in the abortus infections.

The author concludes that though these endothelial and lymphoid growths are common in guinea-pigs, proof is required that they are also present in man, though somewhat similar changes have been described in the spleen by various observers. Plates are given showing the types of giant cells seen in melitensis and abortus infections, with sections of the various tissues affected.

[In *Jl. Trop. Med. & Hyg.*, March, 1921, the reviewer described a large abscess formation in the testicle of a rabbit inoculated intravenously with *M. paramelitensis* which did not occur in the animals inoculated with *M. melitensis.*]

P. W. B-S.

MEYER (K. F.), SHAW (E. B.) & FLEISCHNER (E. C.). **The Pathogenicity of** *B. melitensis* **and** *B. abortus* **for Guinea-Pigs. Studies on the Genus** *Brucella* **nov. gen. IV.**—*Jl. Infect. Dis.* 1922. Aug. Vol. 31. No. 2. pp. 159–197.

After an extensive series of over 1,000 experiments on guinea-pigs, carried out during the last six months, the authors conclude that the inoculation of *M. melitensis* is able to produce in guinea-pigs lesions indistinguishable from those caused by *B. abortus*, cross-agglutination reactions separating the two diseases. They also demonstrate that the virulence of various strains of melitensis is very variable. Only four out of 22 strains were highly pathogenic. These were (11) English, 1896; (21) Bassett-Smith, 1904; (26) Eyre, 1915, and (27) Eyre from goat's milk; six other strains gave rise to occasional lesions. In each series six or more animals were tested with each strain, and often several series were made, with efficient controls. Not only did the cultures thus vary enormously, but the resistance of some guinea-pigs was very remarkable; certain sets from some vendors appeared practically immune, which, with the reported instances of naturally contracted disease in guinea-pigs, points to a local immunity, natural or acquired. The disease ran a rapid and fatal course in 42 per cent. of the infected guinea-pigs; in 58 per cent. it was subacute or chronic. Only 76 of the 143 animals infected in this last set of experiments with the 10 different pathogenic strains yielded evidence which could be considered indicative of infection by positive skin tests, macro- or microscopical lesions, or by positive cultures; therefore, to known toxic strains a large percentage of animals was insusceptible. This irregularity is stated not to be due to the age of the culture, though it is generally believed that the more recently isolated the organism the more likely is it to infect.

The pathological lesions seen in the spleen and lymphnodes of melitensis-infected guinea-pigs appear to be less striking than those found with abortus infections. The sexotropism following any form of inoculation of *B. abortus* is remarkably constant; melitensis in man and goats also appears to show a marked predilection for the sex organs. Old laboratory cultures of *B. abortus* produce lesions often not seen with the naked eye, and this group resembles closely those caused by the intratesticular or intraperitoneal injection of certain strains of *M. melitensis.* It is important to note that the course of infection produced by the two organisms in guinea-pigs is the reverse of that seen in monkeys, when the melitensis is the more invasive. The question whether abortus can be transformed into

TABLE 4.

Summary of Experiments with Strains of B. melitensis.

Strains.	Number of Guinea-Pigs Inoculated.	Number of Infections.	Course of Infection.		Anatomic Lesions.						Cultures.	Serum Reactions.
			Acute and Fatal.	Subacute and Chronic.	Lymph-nodes.	Spleen.	Liver.	Lung.	Testis Abscesses.	Bones.		
1, 2, 3, 4, 5, 7, 8, 9, 10, 23, 24 and 25 ..	60	0	—	—	—	—	—	—	—	—	—	—
2, 3, 4, 5 and 11 ..	41	21	7	14 (44–155)	12	14	9	1	3	—	21	14
6 (Algiers, human ?)	6	2	2	—	2	2	2	—	—	—	2	+2
11 (English, human, 1896) ..	31	11	6	5	4	2	1	0	1	0	11	+4
18 (England, human, 1915) ..	7	6	4	2	1	2	0	0	1	0	6	+2
19 (England, goat) ..	8	3	2	1	0	0	0	0	1	0	3	1
20 (Austria, human ?)	8	1	1	—	—	—	—	—	—	—	1	—
21 (England, human, 1904) ..	13	9	2	7	5	5	0	1	2	4	9	7
22 (Paramelitensis)	7	5	4	1	1	—	1	—	1	—	5	1
26 (England, human, 1918) ..	9	9	2	7	2	4	2	—	4	1	9	5
27 (England, goat, 1917)	8	8	2	6	6	6	1	0	(2)	0	8	4
29 (Sicily, human ?)	5	1	0	1	1	0	0	0	1	1	1	—
Total ..	203	76	32	44	34	35	16	2	14 (2)	6	76	40

melitensis cannot be answered yet; animals immunized with progressive doses of melitensis and abortus, and then inoculated with full doses of *B. abortus* 80, were no more protected than the control animals. The small percentage of positive results with the inoculation of known virulent and otherwise apparently normal strains of *M. melitensis* would suggest that experiments should be carried out on animals which are more susceptible, rabbits or monkeys, if practicable. The septicaemic character of the infection with the paramelitensis strain (B-S. from Nicolle) confirms the results obtained at Greenwich, and explains the severe effects seen in some human infections by this organism.

[This fourth study provides much food for thought and is a model of investigation work, but we do not know yet the exact relationship of *B. abortus* and *melitensis*, nor whether the disease in goats is the same as that of cattle suffering from abortus infection. This is the crux! It is a fact also to be remembered that abortus disease in animals is very common in most temperate climates, while melitensis infection is very rare.]

P. W. B-S.

SKARIČ (J.). **Ueber die Beziehungen des** *Bac. melitensis* **(Bruce) zum** *Bac. abortus infect. bovum* **(Bang).** [On the Relationship of *B. melitensis* (Bruce) and *B. abortus* (Bang).]—*Ztschr. f. Hyg. u. Infektionskr.* 1922. Vol. 95. No. 3. pp. 358–364.

In this research four strains of melitensis from Kral laboratory and eight of abortus were used. The author found that in early recently-isolated cultures of melitensis from animals the coccus character was common whereas in old cultures the short bacillary form staining somewhat irregularly was predominant. He states that the two organisms cannot, without practice, be distinguished. In culture media only slight differences were noted; in broth the deposit of abortus at the bottom of the tube was more abundant (quicker growth); the colour changes on agar were not constant, and were not quite in agreement with those of MEYER and SHAW. Agglutination and absorption work gave little fresh evidence. The melitensis serum agglutinated the melitensis organism to a higher titre than abortus; while abortus serum agglutinated the abortus organism to a very high titre (100–50 per cent.) and gave with melitensis only 6–12 per cent. Melitensis serum which had been absorbed with *B. abortus* completely lost all agglutinating power for other strains of abortus, while melitensis serum was only completely absorbed by the homologous strain. These results point to the conclusion that the agglutinins of melitensis and abortus are not of a simple nature, but a complex; one part is common to both, while the other is apparently specific but varying in quantity. Acid agglutination, complementary fixation, precipitation, and bacteriolytic research gave no further differentiation. The relationship between the two forms is therefore very close; the slight differences in immunity reactions are not greater than between different strains of the same organism.

The question of pathogenicity of abortus to man is not clear. In parts of Austria epidemic abortus disease in cattle is very common, yet there is no undulant fever. Skaric asks, may it not be necessary for the organism to pass through goats to become pathogenic to man? As the milk infected with abortus also carries immune bodies, may these not also protect humans, as suggested by KHALED (see this *Bulletin*, Vol. 19, p. 351)? But this should not make us overlook the possible danger of such infected milk, particularly for infants and sick people.

[Incidentally this emphasizes the importance of sterilizing all milk before use.]

P. W. B-S.

BLANC (Georges). **Une nouvelle méthode de laboratoire pour le diagnostic de la fièvre Méditerranéenne. La réaction de Burnet.**—*Grèce Méd.* 1922. Mar.–Apr. Vol. 24. No. 3–4. p. 9.

SALVAT NAVARRO (Antonio). **Melitococcia o fiebre maltesa.** *Rev. Espanola de Med. Cirug.* Barcelona. 1922. Aug. Vol. 5. No. 50. pp. 433–439.

DENGUE AND PAPPATACI FEVERS.

RICE (Lee). **Dengue Fever: Preliminary Report of an Epidemic at Galveston.**—*Texas Jl. State Med.* 1922. Aug. Vol. 18. No. 4. pp. 217–218.

The last epidemic of dengue at Galveston was 25 years ago, when it attacked practically half the population. Since that time the disease has been endemic, with only one slight outburst in 1918. The present epidemic commenced near the end of June, 1922; at the end of that month there were over 500 cases, and the disease was spreading. In August the number of cases had passed 8,000, and it is feared that the infection will spread throughout Southern Texas. No prophylactic measures have been taken. The interesting fact is noted that early in June, Stegomyia mosquitoes were extraordinarily abundant, they swarmed into all unscreened houses, and it was impossible to avoid their bites; a week later the cases began to appear. There is no mention of any mortality.

P. W. Bassett-Smith.

GÄRTNER (W.). **Epidemiologische Untersuchungen ueber Pappatacifieber bei der Kaiserl. Marine in der Türkei.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. No. 2. pp. 262–305. With 4 text figs.

After a short historical sketch of the disease the author points out that it played a very great rôle during the Dardanelles campaign among the German and Turkish troops, as also in the Balkans and in Asia Minor, in spite of the disease being relatively so mild. The French view of the identity of dengue and phlebotomus fever, as put forward by SARRAILHE in the so-called "Mediterranean dengue," is not acknowledged, the diseases being clinically and epidemiologically different. In tables provided it is shown that the cases in the German Dardanelles force were for 1916, 1917 and 1918 respectively 112, 136 and 101. The local and seasonal distribution is noted; the great majority of the cases occurred in June, July and August. The distribution at the various camps is given in considerable detail, but not the percentages of cases to men. A map of the Dardanelles with its military areas and a view of the hutments in use is provided. It is stated that the spread of the fever was greatly influenced by the strong winds, which brought the phlebotomus flies down from the higher regions. During 1916–17 the landed division at Kilia Tepe was very free from fever, but in 1918 it suffered severely. The orientation of the huts, their exposure to sun, and ventilation were important points. The Turks appear to have had a certain degree of acquired immunity and the author quotes an instance of 38 cases among 60 Germans, and 6 from 120 Turks; the latter often lived in dark, badly ventilated old huts, slept in their clothes, and smoked a great deal. He considers that after an outbreak of the disease an immunity of short duration is conferred on a considerable percentage. Of the 38 affected, mentioned above, 12 had two or three recurrences. In 1916–17 in a German force of 4,000 men, in or near Constantinople, there were 69 cases, but in none of these was there any relapse. When new troops were brought into infected regions the percentage of cases was often high, a common experience in other countries. The persistence of the infection is probably due to the presence of mild cases and these were noticed for 10–14 days before the outbreak of an epidemic. In the clinical and laboratory notes nothing new is reported, but the paper is a war record of considerable importance.

P. W. B-S.

JAPANESE RIVER FEVER.

KAWAMURA (R.) & YAMAGUCHI (M.). **Ueber die Tsutsugamushi-Krankheit in Formosa, zugleich eine vergleichende Studie derselben mit der in Nordjapan.** [On the Tsutsugamushi Disease in Formosa, together with a Comparative Study of the same in Northern Japan.]—*Kitasato Arch. Experim. Med.* 1921. Sept. Vol. 4. No. 3. pp. 169–206. With 5 charts and 8 plates.

The authors give a very interesting description of tsutsugamushi disease, historical, epidemiological, clinical and zoological, as seen in Formosa and Japan, but there is little in it that has not already been reported and is not in textbooks of recent date. There are some excellent tables of blood counts in man, monkeys and guinea-pigs, and a very detailed technical description of the different mites found. They quote 16 cases, of which one only was fatal: in six the initial lesion was in the genital region, in three in the neck. The Formosan cases have a wider distribution than the Japanese and are rather less severe in character, with a lower mortality; of five cases treated in the hospital, three boys and two girls, leucopenia was considerable in all. Blood examinations were always negative. No distinction could be made by cross immunity experiments with monkeys between the Formosan and Japanese types of the disease; that is, the virus of the disease is the same, though the virulence varies. The transmitter, *Trombidium akamushi* Brumpt, is found on the *Mus alexandrinus, M. decumanus, Apodemus semotus, A. sp.*, dogs, cats, monkeys, buffaloes and birds. The *T. akamushi* must be distinguished from *T. pseudo-akamushi, T. gallinarum* Hatori., and *T. corvi* Hatori. Reference is made to the pseudo-typhus of Deli (Sumatra) and the Philippines, and to the Mossman fever of Queensland, which are somewhat similar diseases. No mention is made of the organism described by HAYASHI as the causative agent.

[The relationship of these typhus-like fevers carried by mites, etc., in various parts of the world has been recently shown by MEGAW, who has made a provisional grouping (this *Bulletin*, Vol. 19, pp. 67–8).]

P. W. Bassett-Smith.

KAWAMURA (Rinya), HATTORI (Teikichi) & YAMAGUCHI (Masamichi). **[On the Relation between the Bird and the Red Mite, in Special Reference to the Prevention of Tsutsugamushi Disease.]**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. Feb. No. 2213. [Summarized in *Japan Med. World*. Tokyo. 1921. June 20. Vol. 1. No. 2. p. 21.]

The examination of birds in the endemic areas of tsutsugamushi disease showed that all species except water fowls and hawk eagles were infested with red mites, corresponding with those of mammals both in species and in seasonal occurrence. The destruction of all these "carriers," though an essential factor in the prevention of the disease, is unluckily impracticable.

P. W. B-S.

ISHIWARA (Kikutaro) & OGATA (Noriwo). [**A Preliminary Report on the Study of the Etiology of Tsutsugamushi Disease.**]—*Iji Shimbun* (*Med. News*). 1921. Dec. No. 1083. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 112.]

The authors claim to have found certain spherical bodies in the pathological lesions of the testicles of monkeys experimentally infected. These they were able to cultivate in a special ascitic medium, and from the cultures to infect monkeys.

P. W. B-S.

UNCLASSED FEVERS OF THE TROPICS.

i. HONE (Frank S.). **A Series of Cases closely resembling Typhus Fever.**—*Med. Jl. Australia.* 1922. Jan. 7. 9th Year. Vol. 1. No. 1. pp. 1–13. With 4 charts in text.
ii. STRONG (W. M.). **Cases resembling Typhus Fever.** [Correspondence.]—*Ibid.* Feb. 18. No. 7. pp. 199–200.

i. The notes are given of 16 cases of a peculiar type of fever which occurred in the Adelaide district between February, 1918, and March, 1921, with a mortality of about 20 per cent. The disease is not epidemic, is but little infectious, and runs a course of about 14 days, the fever curve generally dropping rapidly; the typhus-like rash and mental symptoms are very marked and death is usually due to secondary broncho-pneumonia. Diagnosis was difficult, but the close relationship with Brill's disease was early recognized. As an etiological factor the louse could not be incriminated, but a great majority of the infected men had recently been in contact with wheat flour teeming with weevils, and this was thought to have some causative connexion, but beyond coincidence nothing was proved. The serum did not give agglutination reactions with the typhoid group of organisms, and animal experiments were negative. In one case tested the Weil-Felix reaction was positive. There was no definite evidence of importation of the disease, though most of the cases were found at Port Adelaide. Further research is required, particularly as to whether the wheat flour contains other possible sources of infection beside weevils, and systematic examination for the Weil-Felix reaction.

ii. Commenting on the cases described above, Strong suggests that the transmitting agent may be *Pediculoides ventricosus*, a mite-like parasite, which is found at times in corn and is known to cause itching, erythema and urticaria.

[This series of cases is of great interest read in conjunction with those described from India and analysed in the table given by MEGAW (this *Bulletin*, Vol. 19, pp. 67–68).]

P. W. Bassett-Smith.

KEATES (H. C.). **Note on a Case of a Typhus-like Fever occurring at Murree.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 101–102.

The author describes from memory the case of a lady, aged 55, who became ill three weeks after arrival at Murree (Punjab). There was sore throat and fever, slight improvement on the fourth day, then headache, backache, flushed face, injected conjunctivae, rash on back of hands, forearms, feet and legs ; this spread upwards, but the chest and abdomen remained free ; it was dusky and macular with some purpuric spots. Temperature 103°, pulse not over 100, slight jaundice and constipation. The temperature fell by lysis on 12th to 14th day ; convalescence was slow. Serum reactions for typhoid group were negative. The disease was like typhus, except that there was no rash on the trunk, and the infection did not spread though there were four others living in the house. The case resembled rather Rocky Mountain fever in that it occurred at a high altitude, 7,000 ft., and had a gradual onset with sore throat, and in the distribution of the rash, with dusky red swollen face.

P. W. B-S.

MENDELSON (Ralph W.). **Idiopathic Tropical Pyrexia with Special Reference to Intermittent Non-malarial Fever.**—*Milit. Surgeon.* 1922. May. Vol. 50. No. 5. pp. 547–550. With 1 chart in text.

Forms of non-malarial intermittent fever are common in India, and have been reported by MURRAY as not infrequent in Siam. The case of a European, aged 33, is described. There were few subjective symptoms beyond hepatic and vague rheumatic pains ; the pyrexia was of a remittent type and lasted five weeks. The blood picture was peculiar ; though the red cells and the haemoglobin content were normal, there was a decided leucopenia (2–4,000) and only 2 per cent. of small lymphocytes and 4 per cent. eosinophiles. Blood examinations for microfilaria, spirochaetes and malarial parasites, and serum tests gave no specific results. Convalescence is rapid in these cases relatively to the length of the illness. The disease is considered to be mosquito-borne, but no proof is given.

P. W. B-S.

BERNARD (P. Noël). **Sur l'action pathogène du** *Bacillus asthenogenes,* **isolé d'une fièvre de cause inconnue observée en Cochin-chine.** —*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 577–587.

The author has on two occasions reported his experiences of a local fever of unknown origin called *fièvre asthéno-myalgique* [see this *Bulletin,* Vol. 16, p. 422; Vol. 19, p. 69], and from the blood and also from the organs after death he has been able to isolate an organism called by him *B. asthenogenes,* which he believes to be causative of the disease in man and animals. He now gives the results of his experiments on young pigs, which are very susceptible. Those severely infected have paresis or paralysis in six to seven days, and die from the 6th to 15th day. Post-mortem they showed evidence of severe toxic infection of the upper part of the intestinal tract, with hepatic, pulmonary, and renal inflammation. The organism passes from the intestine to the blood; it is eliminated by the bowel and kidney. It is found in rice, soil, etc., and in the digestive tracts of animals. Some cases present the appearances of dry beriberi, from which the disease is frequently not distinguished. In 154 blood cultures he obtained the organism 18 times. Of these 18 cases, two died and two were very severe, with symptoms of beriberi, and the smears from the intestines were like those obtained from infected piglets. The disease was naturally acquired when the animals were fed on (1) polished rice, one feed having been infected with the organism obtained from a human case; (2) sterilized polished rice; (3) autoclaved polished rice, but *not* in those fed on whole rice cooked at 100° C. with an equal part of uncooked rice. Thus the infection can be directly conveyed, it can be indirectly introduced by the spores of the organism, and pre-existing germs in the intestinal tract can develop in the sterilized but favourable media. He thinks that when the disease develops within 10 days on a deficient rice diet the pathogenic organism is *B. asthenogenes*, which is favoured later in its growth by conditions of avitaminosis; that is, in the presence of a gastro-intestinal medium favourable for its growth and fermentation products, microbic and fermentation toxins are formed.

In the discussion WOOLMAN criticized the view that the toxins produced by this organism were the cause of the beriberi syndrome, rather than that the condition of avitaminosis rendered the subject much more susceptible to pathogenic, or even non-pathogenic, organisms in the intestines (MCCALLUM, MCCARRISON, GUERRINI). It is very likely that some of the symptoms of the beriberi syndrome are due to secondary microbic infections. The fact that in his experiments the characteristic symptoms of beriberi and the presence of *B. asthenogenes* infection were found in the piglets fed on polished rice and not in those on whole rice points to the secondary nature of the bacillary infection. The fever in man due to the organism is one of the six-day type tending to relapse, not unlike some forms of dengue.

P. W. B-S.

JOSE AMAYA (Pedro).—**Fiebres climáticas de Tocaima.**—*Repert. de Med. y Cirug.* 1921. Dec. Vol. 13. No. 3. (No. 147.) pp. 135–141. With 3 charts.

ERRATUM.

Vol. 19, No. 1, p. 66. CLAPIER summary. For *fevrier asthenomyalgic* read *fièvre asthéno-myalgique.*

BERIBERI.

ASHFORD (Bailey K.). **Beriberi in the Garrison at San Juan, Porto Rico.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 305–340.

Beriberi has not previously been officially recognized at Porto Rico, though it is evident that the various outbreaks of polyneuritis which have been described were probably this disease The author was sent to investigate, as there was a considerable loss of service from this neuritis in the troops at San Juan. He made an exhaustive enquiry, and was present at one autopsy on an acute case which had died with symptoms of tachycardia and apnoea. At the time there were 10 cases in the hospital; all but one of these were recruits of a few months' service and apparently healthy countrymen, living normally on a protein deficient diet. Though the military duty was not really very severe for these recruits, they were in a state of physiological deficiency, and a voluntary reduction of their diet mainly to rice brought about a true deficiency of vitamin B; this, added to the condition of partial protein starvation, caused the appearance of the disease. Most of the men disliked the meat ration at the barracks, which they often refused, and "filled up on rice." The onset of the disease in the spring followed marches or military exercises, and was put down by the men to getting cold feet. There was no evidence of infection or of defective sanitation, and nothing to indicate that alcohol was the cause of the symptoms. The author recommended the use of undermilled rice and the institution of lectures stating the dangers of eating too little meat and of an excess of carbohydrates.

P. W. Bassett-Smith.

TUPAS (Alberto V.). **Observations on Cases of Infantile Beriberi admitted to the Philippine General Hospital during the Year 1920.** —*Jl. Philippine Islands Med. Assoc.* 1921. May–June. Vol. 1. No. 3, pp. 108–110.

During 1920 there was a decided increase in cases of beriberi both in adults and infants, and in the latter an increase in severity. The cases in infants are divided into three types: (1) cardialgic (acute and fulminating); (2) aphonic (subacute and chronic); (3) pseudomeningitic. The last type was first described by Professor ALBERT, and is differentiated from ordinary meningitis by lumbar puncture, and by the curative action of tikitiki extract. In 1920 there were 11 deaths out of 36 cases, or a mortality of 30·5 per cent., as against 6 per cent. in 1919. As most of the babies affected were under three months in age, weaning was never recommended, being considered too dangerous. The usual treatment of 20 drops of tikitiki given every three hours, equal to 5 cc. of the extract in 24 hours, is not considered sufficient by the author, who gave much larger amounts, 3 cc. every hour, and in fulminating cases it may be given continuously with a medicine dropper until 30 cc. has been consumed. The extract may fail in infantile beriberi when (1) the disease is too far advanced; (2) it is associated with bronchopneumonia; (3) the extract is of inferior quality or the dose is too small.

P. W. B-S.

SULDEY (E. W.). **L'étiologie du béribéri et ses rapports avec les vitamines.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 476–484.

At Makok Mabone, in the Gaboon estuary, in a more or less isolated but cultivated area, with a mixed population living under conditions of defective hygiene, bad climate and food, an outbreak of beriberi occurred chiefly affecting the natives. It followed epidemics of influenza and dysentery and found a number of people with very low resistance. Out of 758 labourers 192 were affected; clinically all types of the disease were present, but 135 were of the severe kind and there were 13 deaths. The small mortality, 7 per cent., is put down to the early and effective treatment. It is stated that practically all the natives have a triple infection of ankylostomes, ascaris, and trichocephalus.

The general ration was 500 gm. of rice, salt fish and a few bananas, but the natives, who habitually live on bananas, when restricted to rice often took it badly. There seemed to be, therefore, semi-starvation, with a deficiency of vitamin B. He states that the cure was easily effected by the administration of 100–150 cc. of fresh palm oil daily, with the addition of cooked bananas in bad cases. From this he gathers that as cooked bananas and palm oil have no vitamins A and B, therefore the disease could not have been caused by their deficiency, [a somewhat rash statement] and formulates this hypothesis: "That beriberi is a highly infectious disease due to an anaerobic microbe, living only in the intestinal canal of subjects who are predisposed by a starchy diet deprived of living ferments or oxydizing substance. The infection is not only carried by the faeces but by contaminated soil," thus following more or less the views put forward by KATO and other Japanese observers. He gives no evidence of his anaerobic organism.

P. W. B-S.

DE MILITA (Vicente). **Beriberi. Su historia en el Estado Apure; primera aparición; epidemias.—Su extensión actual; poblaciones atacadas.** [Beriberi in the State of Apure; its First Appearance, its Epidemy, its Present Extent, and the People Affected.] —*Gac. Méd. de Caracas.* 1921. July 31. Vol. 28. No. 14. pp. 220–228.

This article, originally written for the Third Medical Congress of Venezuela, is an exposition of some peculiar views.

The disease was apparently unknown in Apure prior to 1886, when it was introduced by traders from Guiana. After an interval of six years it again broke out in epidemic form, especially in the Charity Hospital. In 1913 a severe epidemic occurred, and outbreaks were also reported from neighbouring districts. This epidemic continued with varying intensity till 1918, the worst year being 1916.

The sexes were affected equally, but the disease was more virulent in the females. The white population and recent arrivals suffered most. No cases were seen under 15 years of age, and rarely any over 45 years, and in the latter the manifestations were less severe and the course less acute. As predisposing causes, malaria, intestinal parasites, and debility following surgical operations were particularly noticed. The chief exciting causes noted were insanitary dwellings—damp, dark, dirty, and ill-ventilated—and overcrowding, as in the hospital, prisons and the inns, especially if these last were damp and insanitary.

The epidemic always showed greater activity after the rains when the ground was saturated and the streams overflowed.

The diet of the people contains but little rice, and is a mixed one with a tendency to excess of nitrogenous constituents.

Dr. de Milita asserts that "the parasitic nature of beriberi is indisputable," and that the germ lives in the soil and subsoil of the places infected; that it is not communicable from person to person, nor by the bites of insects, but that the patient carries it on his feet and infects the soil of any locality he visits, and that fresh cases arise from this soil infection.*

In the prison disinfection of the cells and rooms was useless, and those to which the occupants were sent temporarily were in turn infected.

He claims that he has prevented the spread of the disease by the simple method of replacing the soil of the hut with fresh sand, and every three or four days sweeping it up, exposing it to the sun and spreading it again. His method of treating patients is to have them removed to a sanatorium, and given sun baths and also "baths" in sun-warmed sand. Little, if any, change is made in the ordinary diet, though, as a precautionary measure, rice is omitted.

H. Harold Scott.

OHOMORI (K.), OHHASHI (Y.), NAKANICHI (H.), HARA (M.), & OTA (T.). **Studies on the Etiology of Beriberi.**—*Japan Med. World.* Tokyo. 1922. May 15. Vol. 2. No. 5. pp. 128–133.

Dietary experiments were made on six patients and three controls in the hospital, to determine in the course of the disease the result of the addition of varying quantities of vitamin B-containing foods. The results were: (1) mild cases became worse when deprived of vitamin B, and after one week developed oedema with heart attacks; (2) when only a minimum of vitamin B was supplied the result was similar but the symptoms took longer to develop (12 days). With very little vitamin B slight cases developed serious symptoms in three weeks; mild cases showed them in 12 days.

They state that the incubative period is from one to two weeks and depends on the ratio of the food (carbohydrates) to the vitamin; it is shorter when the vitamin is little and food much, than when the vitamin is abundant and calories less. An extreme amount of avitaminosis most often gives rise to heart attacks; out of 53 cases implication of the vagus was present in 35, or 63 per cent. Oryzanin or rice bran extract was used with success.

P. W. B-S.

TAGUCHI (K.), HIRAISHI (S.), & KWA (F.). **Experimental Polished Rice Diseases in Human.**—*Japan Med. World.* Tokyo. 1922. May 15. Vol. 2. No. 5. pp. 133–135.

These experiments were carried out on five men, divided into two groups: (1) with polished rice and water; (2) with polished rice, salt and water. Very quickly loss of appetite and constipation were marked and all developed beriberi in a short time. The addition of rice extract caused the bowels to act. About the fourth day there was numbness of the legs and about the tenth day anaesthesia of the hands and round the mouth. Cardiac dilatation came on suddenly after five days. The urine decreased, but there was no sugar or albumen, neither was there acidosis; the body-weight gradually decreased. Treatment with rice bran extract was successful, and it was noticed that the parts affected first were the last to recover. They conclude that beriberi and the disease produced by polished rice are not absolutely identical, but cannot be distinguished clinically.

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* Were these patients free from ankylostomes? If not, the heterodox views of the author may here find an explanation.—[ED.]

[In these cases the effects of starvation were definitely present as well as those of absence of vitamin B.]

P. W. B-S.

TSUKIYE (Sogen). **[Contribution to the Knowledge of Vitamine B.]**—*Jikken Igaku Zasshi* (*Japanese Jl. of Experim. Med.*). 1922. Feb. Vol. 5. No. 6. [Summarized in *Japan Med. World.* Tokyo. 1922. July 15. Vol. 2. No. 7. p. 202.]

The author mentions two forms of vitamin B, an acid form soluble in alcohol as well as in water, and a neutral form soluble in water but not in alcohol. He states that vitamin B given in small quantities has antineuritic power, while if given in large amounts it has a regenerative action on the nerves.

P. W. B-S.

LHUERRE. **Un cas de béribéri humide.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. May. Vol. 3. No. 15. pp. 83–84.

The case was admitted to the hospital at Dakar as one of anasarca and bradycardia. Typical symptoms of acute beriberi were present, with serous effusions and cardiac irregularity. The patient was treated with iodide of iron and improved rapidly, though no change is said to have been made in the diet, and he was discharged in six weeks completely cured. It is suggested that the iodide acted as a catalyser.

P. W. B-S.

KANEKO (Jinzo). **[On the Blood Features and Cerebro-Spinal Fluid in Infantile Beriberi which manifested Cerebrospinal Meningitis-like Symptoms and is so-called Meningitis.]**—*Jikwa Zasshi* (*Jl. Japanese Soc. Pediatrics*). 1921. Oct. No. 257. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 87.]

A slight positive globulin reaction of the cerebrospinal fluid was found in infantile beriberi, and the blood showed a low relative increase in the polymorphonuclear leucocytes and a decrease in the eosinophiles.

P. W. B-S.

KAGOSHIMA (Shigeru). **[On the Changes of the Nerves Trigeminus in Beriberi.]**—*Chuwo Gankwa Iho* (*Central Jl. Ophthalm.*). 1922. Jan. Vol. 14. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 118.]

Marked degenerative changes were found both in the medullary sheath and in the axis cylinders of the fibres of the fifth cranial nerve in a case of fatal beriberi, which before death showed symptoms of affection of this nerve.

P. W. B-S.

KUBO (Kow). **[On the Blood Findings in Beriberi in Special Reference to the Blood Platelets.]**—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. July. No. 2237. [Summarized in *Japan Med. World*. Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 13.]

The author found an increase of blood plates in beriberi, but this had no definite relation to the severity of the case or to the number of the red cells; it was often associated with an increase of the lymphocytes.

P. W. B-S.

ANDERSON (R. J.) & KULP (W. L.). **A Study of the Metabolism and Respiratory Exchange in Poultry during Vitamine Starvation and Polyneuritis.**—*Jl. Biol. Chem.* 1922. May. Vol. 52. No. 1. pp. 69–89.

The results of ABDERHALDEN's experiments, in which he measured the CO_2 output in pigeons, are in general agreement with those of the authors on chickens. The experiments were made to determine the changes which occur in the metabolism, or the variation of the respiratory exchange of poultry during vitamin starvation. Readings were taken of normal metabolism during digestion of grain and mash, during digestion of rice, during vitamin starvation, during polyneuritis, and after recovery from polyneuritis, and the results are shown in many tables. With polished rice there is a continuous loss of weight and heat production, and the diminished metabolism is coincident to a great degree with decrease of food consumption; loss of vitamin B results in a practical cessation of digestion and assimilation; after a meal the respiratory quotient at first rises, then falls below normal. When polyneuritis has become well marked metabolism falls very low; the respiratory quotient seldom rose above 0·75, although the crop might contain much undigested rice, and the heat production was 50 per cent. less than the normal; after recovery from polyneuritis the metabolism and heat production rise rapidly, but the gain in weight is slow.

[The rise and fall of the respiratory quotient after food was shown by DODDS (E. C.) to be a normal characteristic, *Jl. Physiol.*, 1921.]

P. W. B-S.

WEILL (E.), ARLOING (Fernand) & DUFOURT (A.). **A propos du rôle de l'inanition dans la carence des pigeons soumis au régime du Riz décortiqué.**—*C.R. Soc. Biol.* 1922. June 17. Vol. 87. No. 22. pp. 169–170.

These experiments were carried out to ascertain whether retention of food in the crop and intestinal obstruction are causes of polyneuritis in pigeons. Twenty birds were fed naturally, or forcibly if required, and water was given by means of a pipette; they were killed at various periods. The rice found in the crop was practically always not more than that given at the last meal; there was therefore no retention. The contents of the intestines were normal in appearance. From these experiments they conclude that the symptoms were not due to inanition due to faulty evacuation of the crop causing a kind of digestive obstruction.

P. W. B-S.

MOURIQUAND (G.), MICHEL (Paul) & NICODIÉVITCH. **Polynévrite expérimentale par le Riz décortiqué et inanition.**—*C.R. Soc. Biol.* 1922. June 17. Vol. 87. No. 22. pp. 168–169.

Three pigeons were fed on 5 gm. and three on 12 to 14 gm. of polished rice daily. All developed beriberi symptoms, the latter in about half the time required in the former ; that is to say, the polyneuritis appeared earlier and was more acute when the rice ration was greatest. This indicated that the inanition was not the cause of the symptoms, but that they were dependent on an intoxication, as believed by EYKMAN and BRADDON.

P. W. B-S.

KUMAGAYA (Miyakichi M. K.), OYAMA (Tsunewo), KATSURA (Hohei) & SAITO (Dentaro). **[On Beriberi-like Disease of the Rabbit.]**—*Nisshin Igaku* (*Progress in Med.*). 1922. Jan. Vol. 11. No. 5. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. pp. 115–116.]

The rabbits were fed on polished rice ; the paralysis of the hind legs and other symptoms produced were cured by the administration of vitamin B-containing food. The chief post-mortem changes were atrophy of the viscera, including the heart, and sometimes oedema [starvation characters].

P. W. B-S.

KRAUSE (Dorothy Josephine). **The Water Content of the Tissues in Experimental Beriberi.**—*Amer. Jl. Physiol.* 1922. Apr. Vol. 60. No. 2. pp. 234–243.

The possibility that incipient oedema might be a consequence of all diseases due to dietary deficiencies led the author to examine whether the water content of birds and animals with experimental beriberi and animals on starvation diets was increased or not. Chickens, pigeons, guinea-pigs and rats were used.

The weight of separate organs, or the whole body, was obtained both before and after desiccation and compared. In chickens suffering from polyneuritis there was a possible increase of water in the skin only ; in pigeons there was an increase in the intestines, heart, lungs, kidneys, muscles, and skin. In beriberi rats there was an increased content of water in some but not in others. In one guinea-pig with beriberi no increase in water was found. In scurvy guinea-pigs dried whole there was a tendency to an increase of the water content. A quantitative analysis showed evidence of incipient oedema of the tissues in dietary deficiency diseases when it was not possible to see it by ordinary methods.

P. W. B-S.

MONTES (J. E.). **La etiologia infecciosa del beriberi (Nota preliminar).**—Reprinted from *Rev. Filipina de Med. y Farmacia.* 1921. Dec. Vol. 12. No. 12. 12 pp.

The author finds that guinea-pigs injected with blood from beriberi patients give birth to offspring with symptoms and lesions akin to those of infantile beriberi. Liver puncture in beriberi patients has given cultures of *B. mycoides* and other bacilli, and he claims that such patients recover rapidly when vaccinated with these bacilli.

[These bacilli were probably all contaminations of post-mortem growths. *B. mycoides* is not usually pathogenic.]

P. W. B-S.

TOKYO IGAKKWAI ZASSHI (JOURNAL OF TOKYO MEDICAL SOCIETY). 1921. Oct. Vol. 35. No. 10.—**[Reports on the Results of Investigations on the Therapy and Prevention of Beriberi.** IRISAWA's **Clinic for Internal Medicine.]** [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 78.]

Extracts of rice husks were effective both as prophylactic and curative remedies for beriberi, and similar properties were present in beans and meat.

P. W. B-S.

DELANGEN. **O beriberi e as vitaminas.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1922. Mai. & Apr. Vol. 5. 2nd Ser. Nos. 1 & 2. pp. 18–24. With 1 plate

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ANNOUNCEMENT.

FIFTH CONGRESS OF THE FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, SINGAPORE, SEPTEMBER, 1923.

By invitation of the Governments of the Straits Settlements and the Federated Malay States, the Fifth Congress of the Far Eastern Association of Tropical Medicine is to be held at Singapore from September 3 to 17, 1923, under the Presidency of Dr. A. E. HORN, Director of Medical and Sanitary Services, Malaya, with Dr. A. L. HOOPS and Dr. R. DOWDEN as Vice-Presidents for the Straits Settlements and Federated Malay States respectively. The first week of the Congress will be devoted to scientific discussions and the second to excursions to places of medical and sanitary interest throughout Malaya. The Governments of the Straits Settlements and Federated Malay States are contributing towards the expenses of the Congress.

The objects of the Association are to advance the science and art of tropical medicine in the Far East by endeavouring to unite into one compact organization the medical profession of the Far East for the growth and diffusion of medical knowledge; to encourage friendly international intercourse among physicians; to raise the standard of medical education; to enlighten and direct public opinion in regard to problems of hygiene; to form habits conducive to the prevention of disease among the native populations; and to publish to the world the results of such scientific observations. Membership of the Association is open to the members of all duly constituted, regularly organized medical societies, and to all medical officers in the civil, military, naval, or other organized services of Governments in the Far East.

Dr. J. W. SCHARFF, Government Health Officer, Singapore, is honorary Secretary and Treasurer for the Fifth Congress, and those wishing to submit papers are requested to communicate with him as soon as possible.

SCURVY.

DELF (E. Marion). **Studies in Experimental Scurvy. With Special Reference to the Anti-Scorbutic Properties of some South African Food-Stuffs.**—*Publ. of the S. African Inst. for Med. Res.* No. 14. 1921. Sept. 14. 105 pp. With 13 figs. & 1 plate.

This is a detailed account of the excellent work done by the author at the South African Institute for Medical Research during eight months of 1921. The results have already been described and noticed in this *Bulletin.* The paper contains an historical survey, abundance of illustrative tables and charts, and to other workers will be most valuable for guidance and reference. Among the number of important points emphasized the following may be mentioned: (1) it is much easier to prevent than to cure chronic scurvy; (2) the harmfulness of *over cooking* all kinds of food; (3) the importance of recognizing prescurvy conditions. The most valuable native antiscorbutic foods are orange, lemon and pawpaw juice, sweet potatoes and green mealies. The value of Kaffir beer was not found to be very great; the long-fermented beer of the Crown mines was the most popular and contained the highest percentage of alcohol, while the Ferrier Deep beer, which is fermented for only a short time (two to three hours as against two to three days), is the better antiscorbutic and contains three to four times more malt than the former, with as much vitamin C as fresh English dairy milk.

P. W. Bassett-Smith.

VEDDER (Edward B.). **The Etiology of Scurvy. IV. Observations concerning the Physiologic Action of the Antiscorbutic Vitaliment.**—*Milit. Surgeon.* 1922. May. Vol. 50. No. 5. pp. 534-546. With 8 charts in text.

The author describes further work on guinea-pigs with relation to the etiology of scurvy, particularly with reference to the action of the internal secretions. These experiments gave no evidence to indicate that a deficiency of the secretions of the thyroid, adrenals, or pituitary glands could cause scurvy. He found that the antiscorbutic vitaliment was not present in the circulating blood, urine, or faeces of healthy animals. It was not found in the red blood cells, muscles, or bones, but was present in the fresh liver, kidney, spleen, pancreas, thymus and brain; it is, however, not stored in these organs as such, and must therefore form a component part of their tissues. He states that these facts support his theory that the vitaliments act as "building stones," and that cellular metabolism ceases when these essential elements are withdrawn. It is evident that as they are not stored they must be replenished daily.

[It would seem that the bearing of these experiments on scurvy in man is open to question, since animal food is an unnatural diet for guinea-pigs. The presence of vitamin in organs has been previously shown by workers at the Lister Institute.]

P. W. B-S.

THURSFIELD (J. H.). **A Lecture on Rickets, Marasmus, and Scurvy.**—*Lancet.* 1922. Sept. 9. pp. 551–553.

In this lecture the author emphasizes the fact that in his clinical experience since the war, all but one case of infantile scurvy seen by him were due to the use of a well known and much advertised form of dried milk. The source of marasmus has still to be found out, and for that of rickets the old view of CHEADLE still holds good. A deficiency of fats and to a less extent of proteins and phosphates, favoured by and aggravated in degree by bad external hygiene, want of light, warmth and pure air. The theories of MELLANBY, Noel PATON and HESS are discussed.

P. W. B-S.

ALEXANDER-KATZ (Edith). **Larvierte Barlowsche Krankheit und ihre Differentialdiagnose.**—*Deut. Med. Woch.* 1922. Apr. 28. Vol. 48. No. 17. pp. 557–558.

The case is reported of an infant, 10 months old, who had symptoms of disease about the hip joint, viz., flexion, abduction, shortening and pain, without any definite signs of scurvy. The child was born of healthy parents, had been brought up on the bottle, and had not been ill before; no vegetables or fruit had been given. Two weeks before admission it had become sickly and suffered from pains. Rest did not improve the condition and Barlow's disease was diagnosed. The child was then given fresh cow's milk, raw carrot juice, and a quarter of a lemon daily. Recovery was rapid and complete. It was thought that haemorrhage had taken place into the capsule of the joint and that the case demonstrated the difficulty of diagnosis in early stages of the disease, especially when the symptoms are unusually localized.

P. W. B-S.

TUPAS (Alberto V.). **A Report of Two Cases of Scurvy in Breast-fed Infants.**—*Jl. Philippine Islands Med. Assoc.* 1921. Jan.–Feb. Vol. 1. No. 1. pp. 23–24.

The cases were respectively one and two months old. The signs were few, mostly arthritic, showing the X-ray picture common in scurvy, namely, the white line at the epiphysial margin. In neither was there any haemorrhage from the gums. The cures were rapid and complete when lemon juice was given. The diet of the mothers consisted mainly of rice, vegetables, fish, and rarely meat, and was probably deficient in antiscorbutic vitamins.

P. W. B-S.

HAUSMANN (Theodor). **Das Blutbild bei Skorbut mit Berücksichtigung der Linksverschiebung.** [The Blood Picture in Scurvy, with Special Reference to the Shift to the Left.]—*Ztschr. f. Klin. Med.* 1922. Mar. 3. Vol. 93. No. 4/6 pp. 346–357.

From the examination of the blood in 24 cases of scurvy, details of which are given in a tabular form, the author concludes that there is always a reduction in the relative number of the polynuclear cells, even when conditions usually producing an increase are present. A definite reduction in the total white cells and a relative lymphocytosis are usually present. The Arneth count did not show a move to the left as might have been expected, thus confirming the view that etiologically scurvy is non-infectious. By the relative decrease in the polymorph cells scurvy blood films are distinguished from those of haemorrhagic diseases of a septic nature. [It must be remembered that septic conditions may be sequelae of true scurvy.] Urobilinuria, together with achlorhydria is only seen in severe cases of scurvy associated with degeneration of the tissues.

P. W. B-S.

MOURIQUAND (G.) & MICHEL (P.). **De l'action de certains aliments gras sur le métabolisme osseux. Adjuvants et antagonistes de la substance antiscorbutique.**—*C.R. Soc. Biol.* 1922. May 27. Vol. 86. No. 19. pp. 1170–1172.

The experiments were made with guinea-pigs, and the fats used were butter, olive oil, and cod liver oil, with a basic diet of barley plus fresh lemon juice. Those given daily 2·5 cc. of olive oil showed no evidence of scurvy lesions from the 38th to the 160th day. One only out of seven on 5 gm. of butter was affected; it died on the 55th day. Ten were given 2·5 cc. of cod liver oil; these without exception presented typical bony changes.* As the iodine in the oil might possibly have some action, other guinea-pigs were given with their daily diet a quantity of iodine corresponding to that present in 2·5 cc. of cod liver oil; none of the animals showed any signs of scurvy up to the 150th day; when hay was added to the diet of barley, lemon juice, and cod liver oil no signs of scurvy were noted. [This is a very unnatural diet for guinea-pigs and liable to cause intestinal troubles, if taken.] The authors consider that these results show the favourable action one food may have when given in combination with an otherwise scurvy-producing diet. The unfavourable results of cod liver oil on guinea-pigs are interesting when its curative effects on man and rats is remembered.

[The condition in guinea-pigs is more that of rickets than true scurvy, and deductions from animals fed on diets unnatural to them must be made with great care.]

P. W. B-S.

MOURIQUAND (G.), MICHEL (P.) & BARRE (Léon). **Croissance et substance antiscorbutique.**—*C.R. Soc. Biol.* 1922. May 27. Vol. 86. No. 19. pp. 1167–1169.

From their experiments on guinea-pigs the authors conclude that the absence of antiscorbutic substance (given in lemon juice) does not modify appreciably the growth of the young animals during the period which precedes the characteristic bone signs; the changes in weight generally come on with these signs and run parallel to them.

P. W. B-S.

JOHNSON (J. M.). **The Comparative Antiscorbutic Values of Milk.**—*Public Health Rep.* 1922. Apr. 28. Vol. 37. No. 17. pp. 989–1021. With 15 charts in text.

The author carried out a large number of experiments with guinea-pigs, using fresh milk and various forms of preserved, reconstructed, pasteurized, and dried milks. Full reports and charts of the results obtained are given. He emphasizes the importance of making complete pathological studies of the bones, which will often show evidence of the disease not noticeable clinically, and states that no reliance can be placed on reports without these studies. The amount of antiscorbutic vitamin in fresh milk is not very great and is injured by any process of drying. It is not wise to depend upon certified milk; strong antiscorbutic material, such as orange juice, should be added. One brand of dried milk powder appeared to have retained a large amount of its antiscorbutic substance; this was not due to the process used, as other brands made the same way and by the same company were very deficient. The use of whole milk powder and skim milk powder made by the roller process gave no better growth than the spray process milk powders or the pasteurized milk. The age of the milk before treatment (even in respect of a few hours) appears to exert an important influence, as also the amount of the milk consumed by the animals, none of which was forcibly fed.

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* The sample of cod liver oil may not have been a good one.

P. W. B-S.

COHENDRY & WOLLMANN (E.). **Quelques résultats acquis par la méthode des élevages aseptiques: (1) Scorbut expérimentale: (2) Infection cholérique du cobaye aseptique.**—*C.R. Acad. Sci.* 1922. Apr. 18. Vol. 174. No. 16. pp. 1082–84.

The authors' experiments before the war had shown that in guinea-pigs aseptic from birth, as well as in those nourished on sterilized food, debility and paresis of the hind quarters occurred. His new work has been specially directed to the detection of these or other evidences of scurvy. It was definitely demonstrated that more or less completely bacterially-sterile animals (for in time they frequently became contaminated) did show other signs, such as looseness of the teeth and brittleness of the bones, which are manifestations of avitaminosis, and are adverse to the theory that scurvy has a microbic origin. SCHOTTELIUS, experimenting with chicks, has recorded similar observations and results. The author states that by adding sterile orange juice to the autoclaved diet of these bacteria-free animals he noticed for the first time that there was an increase of weight in 80 per cent.

P. W. B-S.

LABORATORY METHODS.

FÜLLEBORN (F.). **Einige Beiträge zur mikroskopischen Technik.** [Contributions to Microscopical Technique.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 2. pp. 44–57. With 1 plate.

In these contributions to microscopic technique the author draws attention to some methods, and fully describes certain modifications, that have proved valuable to him in his helminthological studies, and one or other of which he thinks may be found useful in the study of pathological anatomy, zoology, etc. This he does under five headings :—

1. " Mikro-Kaiserling " Preparations.

Small haemorrhages in tissues, blood distribution in capillaries, etc., may very often be well shown in simple razor-sections of organs treated and preserved by the Kaiserling process.

Small pieces of the organ to be examined are put into Kaiserling I solution and are kept there for 24 hours. Razor-sections are then made, and these are treated with absolute alcohol for ¼–½ hour before they are transferred into Kaiserling II solution. They may be mounted on slides direct in Kaiserling II, which is evaporated down before the cover-slip is sealed with glycerine jelly ; or they may be embedded in glycerine jelly after having been kept in small dishes of Kaiserling II in a paraffin oven for 24 hours to allow the solution to concentrate. After some months the sections slowly fade, but still remain useful.

2. Cyanochin to show the Superficial Structures of the Cuticle of Worms.

On the principle of the Indian ink method of demonstrating spirochaetes, Cyanochin, as lately used by BRESLAUER to show the superficial structures of Infusoria, shows the superficial structures of small nematodes very well, and perhaps also may be used for small trematodes. The living material may be used, or the larvae allowed to dry on a slide and the Cyanochin solution poured over it. If fixed with alcohol after drying and then treated with Cyanochin, the bodies of the larvae stain deep red. Cyanochin preparations, without coverslip and without balsam have kept unaltered for about 1¼ years.

3. Squash Preparations of Worms and Tissues on Permeable Celloidin.

Squash preparations play an important part in the examination of worms and in the search for them in fresh tissues ; and may occasionally be found useful in the domain of Protozoology also. Naturally, microtome sections supplement squash preparations when the finer structural alterations caused by the parasites [and the exact relations of parasite to tissue] are to be studied ; but squash preparations have the advantage of giving a general idea of the worm, showing it whole, so that it can be measured and examined.

To overcome the difficulties experienced in the fixation and subsequent manipulation of squash-preparations made between glass slides the author recommends a device of putting the material to be squashed between a strip of celloidin permeable to fixing fluid and a coverglass and interpolating the whole between two glass slides through which the pressure is exerted. Tearing and detachment of the tissue on separating the slides is thereby prevented. The coverslip and celloidin underlayer stick close together, and can, if desired, be treated as a celloidin section in further manipulations. The preparation of the sheet or strip of celloidin and the subsequent manipulations of the material squashed between it and the coverglass are very fully described in the paper.

4. The Coverslip-Celloidin-Chamber Method of Preserving Worms, Protozoa, etc.

The author has hitherto used this method only for worm larvae and infusoria, but thinks it may be useful for other material as well. When examining small organisms in water, normal saline, etc., put a drop of the fluid containing them on a thin celloidin sheet laid on a slide and place a coverslip on top. If material worth preserving is found, bind the coverslip to the celloidin underlayer. The entrapped material can be then conveniently dealt with. Full directions for dealing with it are given in the paper.

5. Preparations cut or punched from Celloidin Plates in which Small Free Living Animals have been incorporated.

This method of dealing with small free-swimming organisms is fully described: the general principles are as follows:—

> After the organisms present in a bulk of fluid have been killed, centrifugated and fixed, the fixing fluid is removed, the deposit washed [stained if desired], and brought through the various dilutions of alcohol up to absolute. In about half an hour or less add an equal quantity of ether and as much celloidin solution as will form a solution of quite fluid consistence and then pour the mixture with the contained objects distributed through it in not too thin a layer on slides that have been smeared with sugar-dextrin solution and dried. After ½–1 minute, the slides are placed in water (or first into 70 per cent. alcohol) and the celloidin films with the organisms incorporated peal off and can be further dealt with as celloidin sections, or otherwise as desired.

The interesting statement may be noticed that the stunted first pinion feather of the snipe's wing, about 2 cm. long and 3 mm. broad, has a fine rounded, stiff, and uniformly elastic point, and is for fine microscopic work by far the most delicate instrument known to the author.

J. D. Thomson.

MALONE (R. H.). **The Demonstration of the Capsules of the Pneumococcus by a Modification of Benian's Relief Stain.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 804–805. With 1 plate.

A thin smear of the material to be examined, fixed by heat and allowed to cool, is stained in 2 per cent. aqueous solution of Congo red for about a minute. Excess of stain is then drained off, and the smear allowed to dry in air. It is then treated with 1 per cent. HCl in 96 per cent. alcohol for a few seconds, and again allowed to dry. When dry it is counterstained with 0·5 per cent. aqueous solution of methyl violet (or gentian violet) for about a minute, after which the excess of stain is flushed off with tap water, and the smear is blotted with filter paper or is allowed to dry in air. It is then ready to be examined with an oil immersion lens.

The value of this method as a means of differentiating pneumococci from allied organisms lies in its simplicity and the absolute certainty with which, according to the author, capsules can be demonstrated.

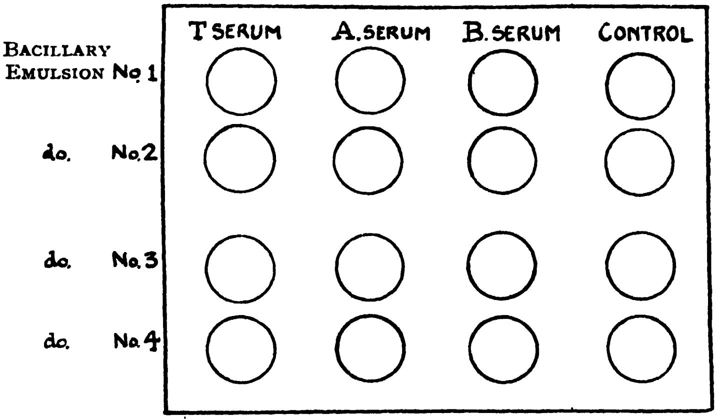
A coloured plate illustrates the appearance and manner of staining.

J. D. T.

MACKIE (F. P.), with TRASLER (George). **Laboratory Records from Mesopotamia.**—*Indian Med. Gaz.* 1921. Nov. Vol. 56. No. 11. pp. 411–418.

The first instalment of these records contains much that is interesting concerning the organization and development of Laboratory work in Mesopotamia during the Great War, but is referred to here simply to extract the following from the section treating of the enteric fevers:—

" We used a very simple method for our agglutinations which requires little apparatus and is quick and efficient. It was as follows:—Take a quarter-plate negative and clean off the gelatin in hot soda solution. Make rings on the glass with vaselin (as those made with a grease pencil are apt to break and allow the fluids to mix). For this purpose take a piece of wide rubber tubing, ¾ in. diameter, cut it cleanly across and use it to stamp out rings. This is done by putting some filter papers at the bottom of a cigarette tin and saturating them with melting vaselin. The rubber tube is kept in the tin and the filter paper used as a vaselin pad. By pressing the end of the tube first on the pad and then on the glass plate a series of hollow grease rings of uniform size are quickly made.



Illustrating quarter-plate negative with vaselin rings arranged for examination of four colonies.

" A quarter-plate negative will take sixteen rings in four rows of four in each row.

" One drop of saline is put in each ring and in each horizontal row a suspected colony is emulsified. Four colonies can be examined on one plate.

" When the colonies are emulsified take the standard T.A.B. high titre sera in a dilution of about 1 in 100 and put one drop of T. serum in each of the rings in the vertical column under T. and similarly with A. and B. sera. The fourth vertical row should have one drop of saline or of dilute normal serum added as a control. If this shows agglutination it means the organism is auto-agglutinative and nullifies all the tests in that horizontal row.

" As a matter of fact we never found either T.A. or B. auto-agglutinative, and if the control showed such a change the organism could safely be excluded as one of the enteric group.

" The above diagram makes the technique clearer.

" It is obvious that any organism and any serum may be examined in this way and if the bacillus is an unknown one which might be one of the dysentery, cholera or food poisoning group we used row Nos. 2 and 3 to test it with high titre sera of Shiga Flexner, Cholera and Gaertner. In this way the potentialities of an organism as regards its serum reactions may be quickly and easily tested. In a country like Mesopotamia where a fierce dry 'shamal' wind was frequently blowing it is essential to keep the agglutination plate in a moist chamber and this is best done by laying wet filter papers at the bottom of a large Petri dish and supporting the plate on glass rods. If the Petri dish be lined with black paper or over-exposed negatives used from which the gelatin has not been removed it is possible to make the observations on the progress of agglutination with a hand lens without removing the cover of the Petri dish.

" Using the dilutions of serum mentioned, it is generally easy to detect agglutination in a few minutes, generally under 10 minutes, and by taking the colony direct from the plate to give the clinician a report in 24 hours from receipt of the specimen.

" After this preliminary report we used to put the organism up to the four sugars mentioned [lactose, glucose, mannite and dulcite] and to the titre limit of the sera. It is not necessary to use pipettes or tubes at all, as all the dilutions may be made on plates as described and if the moist chamber is used observations can be made 24 hours later without any risk of the dilutions drying up.

" Widal reactions may be made with the same technique. Though we found it more accurate to use Wright's tubes or better Dreyer's technique."

J. D. T.

HARVEY (W. F.). **Bacteriological and Laboratory Technique. Sections IV, V & VI.**—*Indian Jl. Med. Res.* 1922. Jan., Apr. & July. Vol. 9. No. 3 & 4. pp. 405–444; 692–725; and Vol. 10. No. 1. pp. 1–56.

The fourth instalment deals with standardization, the particular items being numbered from S7 to S8.23.

The fifth and sixth instalments deal with " Cultural Methods " and with " Stains and Staining " respectively—the particular items under Section V (Cultural Methods) being numbered from C4.1 to C4.553, those under Section VI (Stains and Staining) from S4.1 to S4.333. Each section has its own index arranged alphabetically.

J. D. T.

JOSEPH (F. H.). **A Simple Device for collecting Blood for Transmission to a Laboratory at a Distance for Subsequent Estimation.**—*S. African Med. Rec.* 1922. Aug. 12. Vol. 20. No. 15. pp. 282–284. With 5 text figs.

Those interested will find in the original a full description, illustrated by text figures, of the apparatus which would be supplied from laboratory to the practitioner; directions for the collection and dilution of the blood; an account of the laboratory examination; and a statement of the advantages of the special appliance both to the practitioner and to the laboratory worker.

The apparatus is suitable not only for sending by post but also for collecting specimens under any conditions where it is not convenient to examine them immediately. By using the special solutions that are recommended, viz. :—

(*a*) For erythrocytes. Sod. chloride (pure) 1·2 gm.; formalin, 2 cc.; distilled water to 100 cc. filtered;

(*b*) For leucocytes. 1 per cent. aq. solution of methyl green (0·0) 3 cc.; 1 per cent. acetic acid to 100 cc. filtered;

it is said that the cells remain well preserved up to 72 hours, and that the counts obtainable at the end of this period are essentially the same as those made immediately after collection.

" It is claimed for this device, therefore, that reliable estimations are given by its use, and that, as specimens will keep satisfactorily for at least three days, it solves the problem of making blood-counts at a distance."

J. D. T.

i. DREYER (Georges). **A Simple Procedure for the Accurate Enumeration of Blood Cells and Bacteria without the Use of a Counting Chamber.**—*Lancet.* 1921. Jan. 29. pp. 219–221.
ii. WAUGH (Theo. R.). **An Efficient and Practical Method for the Counting of Red Blood Cells.**—*Arch. Intern. Med.* 1922. Aug. 15. Vol. 30. No. 2. pp. 216–220.

i. The procedure described in this article, although based on the same general principles as WRIGHT's method for determining the number of bacteria per unit volume of a given suspension " differs in that it can be used to count not only bacteria but also human blood cells, and that the standard consists of a permanent suspension containing an exactly determined number of corpuscular elements per unit volume." . . . .

" The corpuscular elements selected for the preparation of the standard emulsion are the red corpuscles of the blood of a hen. The fowl should be young and in good health. The reasons for the selection of the red cells of the hen are the following :—

" 1. The cells are of uniform size.

" 2. They are of approximately the same specific gravity as mammalian red cells.

" 3. The cells are slightly larger than the human red cell or average mammalian red cell.

" 4. They are readily distinguished from mammalian red cells by their elliptical shape and the presence of nuclei, which make it impossible to confuse them with mammalian red cells in a mixture of the two.

Preparation of the Standard Suspension.

" Prepare a solution containing approximately 1·3 per cent. perchloride of mercury in sterile normal (0·85 per cent.) saline solution. Bleed the fowl directly into this solution, allowing approximately 1 c. cm. of blood to each 100 c. cm. of the solution. Agitate the recipient fluid gently while the blood is being added, so as to ensure a thorough mixture. Leave for one hour, shaking from time to time to prevent sedimentation of the blood. At the end of the hour centrifugalise *just enough* to deposit the red cells, pour off the supernatant fluid, and fill up to the original volume with a solution of 4 per cent. perchloride of mercury in normal saline solution. Allow the mixture to stand for six hours, occasionally shaking the flask or bottle. At the end of this time agitate the flask to emulsify the cells and then centrifugalise. Wash the cells twice with normal saline solution, each time emulsifying them before centrifugalising. Pour off the supernatant fluid, and fill up to the original volume with normal saline solution to which has been added a minute amount of perchloride of mercury, *i.e.*, just enough to prevent bacterial infection.

" The suspension is now ready for standardisation. As the result of a large number of experiments, I have arrived at the conclusion that a convenient suspension to work with is one which contains about 20,000 cells per cubic millimetre. Therefore, the suspension should be brought to this standard in the usual manner, using normal saline solution as the diluting fluid, and counting at least 1,000 cells in each of 10 successive drops, or about 10,000 cells in all.

" Standard suspensions thus made have been kept for eight months at ordinary temperatures without showing any change in the number or appearance of the corpuscles.

Determination of the Number of Red Cells in a Given Blood by Means of the Standard Suspension.

" The blood, taken in the usual manner, is diluted 1 : 200, with a solution of 1·3 per cent. perchloride of mercury in normal saline solution. For example, one adds 0·1 c. cm. of the blood to 19·9 c. cm. of the mercury saline solution, previously measured into a test-tube, carefully washing out the blood pipette and thoroughly mixing the resulting dilution. The tube containing the blood dilution is shaken to secure an even distribution of the cells in the suspension and immediately 1 volume—*e.g.*, 0·1 c. cm.—of the fluid is transferred to a dwarf test-tube. In the same manner the tube or bottle of standard suspension is shaken and an equal volume of this fluid is measured into the dwarf test-tube, which is agitated so as to mix the fluids thoroughly. A drop of the mixture is placed immediately upon a clean slide and covered with a coverslip, care being taken to avoid air bubbles. The drop should be only large enough to form a thin film between the coverslip and the slide, and not so large that the coverslip floats. A coverslip of convenient size is 22 mm. × 22 mm."

For counting, one uses a dry lens of convenient magnifying power and may obtain a field of convenient size by cutting from a piece of black paper a small diaphragm with a central square aperture of desired size, and placing this in the eyepiece. The extreme periphery of the area covered by the coverslip should be avoided, and at least 500 cells in each of two drops from the same mixture should be counted.

To calculate the number of red cells contained in each cubic millimetre of the blood examined, multiply the factor which has for its numerator the sum of all the blood red cells counted and for its denominator the sum of all the corpuscular elements of the standard suspension counted in the same fields by the number of corpuscular elements in each cubic millimetre of the standard suspension, and then by the dilution of the blood.

" *Example.*—Suppose the standard suspension contains 21,000 nucleated red cells per cubic millimetre. The blood sample is diluted 1 in 200. A drop of a mixture of equal volumes of these two solutions is prepared for the microscope and about 50 fields are counted. The sum of the nucleated red cells in the 50 fields is 319 ; the sum of the human red cells in the 50 fields is 405.

$$\frac{405}{319} \times 21{,}000 \times 200 = 5{,}294{,}000$$

" Therefore the blood examined contains 5,294,000 red cells per cubic millimetre.

Leucocyte Count.

" To determine the number of leucocytes in a given blood sample by this method the procedure is as follows :—

" Into a dwarf test-tube measure three volumes of a 0·3 per cent. solution of acetic acid in distilled water, to which has been added 0·6 per cent. of a 1 per cent. solution of methyl-violet (6B). Add one volume of the blood to be examined, mix carefully, and allow to stand for a short time until the human red cells are haemolysed. Then add one volume of the standard suspension of nucleated red cells and mix carefully. Place a drop of the mixture on a clean slide and cover with a coverslip, observing the same precautions as in the case of the red-cell count previously described. For counting use the same objective and ocular as for the counting of red cells, but the paper diaphragm previously used in the ocular should be left out, and the nucleated red cells and leucocytes present in the whole field should be counted. The same total number of cells—*i.e.*, about 500—should be counted as in the case of the red cell determination.

" The calculation of the number of leucocytes per cubic millimetre of blood is performed in the manner already indicated above—namely, by dividing the number of nucleated red cells into the number of the leucocytes, and multiplying this factor by the number of cells in 1 c. mm. of the standard suspension. If dilutions other than those here indicated are used the calculation will naturally have to be modified accordingly.

" *Example.*—Suppose the standard emulsion contains 21,000 nucleated red cells per cubic millimetre. One volume of the blood to be examined is added to three volumes of the acetic-acid-methyl-violet solution, and mixed. To this mixture is added one volume of the standard suspension. Seventy fields are counted, giving a total number of 409 nucleated red cells and 145 leucocytes.

$$\frac{145}{409} \times 21{,}000 = 7{,}445.$$

" Therefore the blood examined contained 7,445 leucocytes per cubic millimetre.

Enumeration of Bacteria.

" For counting bacteria in a suspension the following technique has been adopted :—

" A special standard suspension for this purpose is prepared as follows : The perchloride-fixed nucleated cells are washed several times with normal saline solution to remove the free perchloride, and then made up with sterile normal saline solution to a standard of about 30,000 per cubic millimetre. To secure sterility a minute amount of formalin is added. For the purpose of counting a mixture of one volume of the standard suspension, one volume of the bacterial suspension suitably diluted, and one volume of 0·5 per cent. methylene-blue solution is prepared and counted, as in the case of the blood count, enumerating the nucleated cells and the bacteria in each field.

" *Example.*—Suppose the standard suspension contains 30,000 cells. The bacterial suspension is diluted 1 in 200. Into a dwarf test-tube is measured : one volume of the standard suspension, one volume of the diluted bacterial suspension, one volume of 0·5 per cent. methylene-blue solution, and the test-tube shaken to thoroughly mix the contents. A drop of this mixture is immediately transferred to a slide, covered with a coverslip, and counted as in the case of the white cell count, except that an oil immersion lens is used. Eighty fields are counted, giving a total number of 500 nucleated red cells and 400 bacteria.

$$\frac{400}{500} \times 30{,}000 \times 200 = 4{,}800{,}000.$$

" Therefore the bacterial emulsion contains 4,800,000 bacteria per cubic millimetre."

After making an extensive series of comparative counts to compare the relative merits of this method with those of the counting chamber, the author concludes that :—

" By careful procedure, and by counting the numbers of cells indicated . . . the method discussed in this paper yields extremely accurate results, which compare more than favourably with the results obtained by the use of a counting chamber. It furthermore possesses the following distinct advantages : (1) it can be used with equal facility for counting erythrocytes, leucocytes, and bacteria ; (2) it does away with the use of a costly counting chamber ; (3) it is quicker and less fatiguing to the eye."

ii. While commending DREYER's method for its "universality and accuracy," the author of this paper introduces changes in the constitution of the standard suspension and in the technique employed, and then concludes that "a procedure is devised which has distinct advantages for the enumeration of erythrocytes and offers a method which is rapid, accurate and clinically practicable."

The reasons given for using "crenated, fixed and stained human red blood cells" in place of avian erythrocytes as the corpuscular elements in the standard suspension are hardly likely to be taken seriously. The clinician might, if necessary, be supplied with a standard suspension in which the avian normal erythrocytes are suitably stained.

The use of the standard suspension to dilute the blood to be examined is not to be commended, even although the error introduced "is" (owing to the high dilution, 1 to 200) "of no clinical consequence."

The changes in technique are supposed to simplify the calculation of the patients' red cells, but this is more apparent than real. With DREYER's more accurate technique and a standard suspension of 20,000 corpuscles per c.mm., the calculation, though differently stated, resolves itself into multiplying by 4 in place of by 5 as required in the example given in this paper under the heading "Calculation of the Patient's Erythrocyte Count."

J. D. T.

POLIDORI (V.). **Préparation simple d'une éosinate de bleu de Méthylène pour colorations hématologiques.**—*Bull. Soc. Méd.-Chirurg. Indo-Chine.* 1921. July. Vol. 12. No. 1. pp. 87–89.

For double staining of blood films the author recommends the following stains as being easy of preservation and simple in use.

Three stock solutions are prepared, all of which will keep well, namely: (A) a concentrated solution of Borrel blue; (B) a solution of 1 gm. of medicinal methylene blue in 10 cc. of methyl alcohol, to which solution 90 cc. of 90 per cent. alcohol is added and the whole filtered; (C) a 1 per cent. alcoholic solution of eosine.

For use, equal parts of solutions B and C are mixed (the mixture keeps good for several days) and the unfixed film is flooded with 15 drops of this mixture and left for three minutes. The film is now placed in a staining dish containing a 1·5 per cent. filtered dilution of solution A, being first placed face upwards for 30 seconds during which the dish is oscillated, and then turned face downwards and left at rest for 10 to 15 minutes, after which it is washed.

A. Alcock.

EPSTEIN (H.). **Ueber eine neue Methode der Blutzellen- und Blutparasitenfärbung. Vorläufige Mitteilung.** [A New Method of Staining Blood Cells and Blood Parasites. Preliminary Communication.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 164–168.

The method which the author describes depends on the metachromatic properties of Toluidin blue, and on the characteristic nuclear staining element "Rot aus Toluidinblau" (probably analogous to "Rot aus Methylenblau") being increased by the addition of an organic salt of lithium.

Two solutions are required:—

Solution A.—	Toluidin blue	1 gm.
	Lithium citrate	1 gm.
	Distilled water (neutral)	100 cc.

The lithium citrate is first dissolved in the distilled water at room temperature. The Toluidin blue is then added and dissolved and the whole is then passed through moistened filter paper to remove a colloidal deposit which forms and in part sticks fast to the vessel. The filtrate is now ready for use.

Solution B.—A saturated solution of Picric acid in distilled water.

Thin films or smears of blood, exudate, or organs fixed in methyl alcohol, are stained in solution A. Slide preparations should be immersed vertically in suitable receptacles containing the stain, while coverslip preparations should be floated (film down) on the surface of the staining fluid. Smears of mammalian blood are sufficiently stained in 15–30 minutes, those of bird and amphibious blood in 10–20 minutes. But while there is an optimum time which can be found for each class of object by trial, there seems to be little danger of overstaining. According to the author, thin smears, even if left for 24 hours in the stain, remain delicately stained and transparent.

When sufficiently stained the smears are washed under the tap. To the naked eye they should now appear transparent and of a delicate greyish blue colour. They are then immersed in solution B for 1–3 seconds or until the colour changes to light green. After this they are thoroughly washed for a few seconds under a strong stream of water and then dried with filter papers. Solution A can be used over and over again, so that 30–35 cc. in a suitable vessel for slides is capable of staining several hundreds of smears. Solution B has to be changed as soon as its original golden yellow colour assumes a greenish tint. 30–35 cc. in a suitable vessel suffices to differentiate 15–20 smears.

The author, after using this method daily for over six months and controlling it frequently with Pappenheim's stain, recommends it to his professional colleagues as reliable for clinical blood examinations. The results are, he says, clean and sharp, without deposit, and in colouring differ from the common methylene blue-eosin stains (including Giemsa) only in that the erythrocytes and eosinophile granules are stained green. The solutions are easily prepared and require neither glycerine nor alcohol in their preparation, which under certain circumstances may be a distinct advantage. The stain is always ready for use, acts quickly, and can always be depended upon to give reliable and uniform results.

The oxalate or the tartrate may be used in place of the citrate of lithium in the preparation of the stain. With the tartrate the erythrocytes are said to stain most delicately—an advantage in staining the blood of birds, fishes, amphibians and reptiles; but similar results may be obtained by diluting the citrate stain 1 : 10 and lengthening the time of staining. The author hopes to investigate the chemistry of Toluidin blue, the influence of the hydrogen-ion concentration on its solutions, etc., and to communicate his results later on.

J. D. T.

i. Puente (J. J.). **Technique facile pour la coloration des spirochètes dans les frottis.**—*C.R. Soc. Biol.* 1922. Feb. 18. Vol. 86. No. 7. pp. 410–411.

ii. Renč (V.). **Ueber eine neue Modifikation der Spirochätenfarbungs methode.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 174–176.

i. After a number of trials the author of this paper found that Sahli's boracic blue, recently prepared or metachromatic, gives clear coloured images on clean preparations. His technique is as follows :—

1. Prepare thin smears of the material to be examined.

2. Fix in Ruge's solution (formol 2 parts, acetic acid 1 part, water 100 parts).
3. Complete the fixation in ether-alcohol.
4. Filter and heat in a test-tube the following solution: Tannin 5 per cent., 3 parts, chlorhydrate of anilin 3 per cent., 1 part, until it boils, and pour the boiling liquid over the smear and leave it to cool.
5. Flush off the solution and wash the smear in running water.
6. Stain for one minute in boracic methylene blue.
7. Flush off the stain, dry, and examine.

Treponema pallidum stains blue and is recognized by its morphological character.

ii. This author, having experienced many disadvantages pertaining to the original "Tribondeau" method, here describes a modification which he claims to have abundantly tested; and, after having compared it with Giemsa and other useful methods, he considers that it is the easiest, quickest, and most reliable of all.

Solutions required :—

I.	Tannin	5 gm.
	Acid acetic	2 cc.
	Formalin 4 per cent.	5 cc.
	Distilled water	40 cc.
	Alcohol 96 per cent.	60 cc.
II.	Nitrate of silver	5 gm.
	Distilled water	100 cc.
	Liquid ammonia, q.s., added drop by drop until the brownish cloud which first forms is redissolved.	

Order of procedure :—

1. Prepare a thin smear of the material to be examined and allow it to dry in air.
2. Cover the smear with solution 1 and after carefully warming it for a short time over a flame allow the alcohol in the solution to burn off, taking care to keep the smear covered with solution to prevent it from being burned.
3. Rinse in a very weak solution of ammonia (10 to 50 drops to a litre of distilled water).
4. Cover with solution II and warm for a short time—1 to 1½ minutes being sufficient to complete the staining.
5. Flush off, and rinse in distilled water.
6. Dry and examine.

The spirochaetes are well stained and retain their characteristic form. The background is pale yellow and there is no deposit

J. D. T.

OEHLER (R.). **Schnellfärbung von Darmflagellaten.** [Quick Staining of Intestinal Flagellates.]—*Deut. Med. Woch.* 1922. Apr. 7. Vol. 48. No. 14. pp. 456–457. With 2 text figs.

Methods recommended to the clinician for diagnostic purposes :—

1. Ruppert's—suitable for the finest spirochaetes (*e.g.*, *Spironema pallida*) and for trypanosomes, as well as for intestinal flagellates.

(*a*) For spirochaetes and trypanosomes.

(1) Prepare thin smears on slides of the material to be examined.
(2) Allow the smears to dry thoroughly in air.
(3) Put them for 1–2 minutes into Ruge's fluid (acetic acid 1 part, formalin 20 parts, water 100 parts).

(4) Flush off and wash.
(5) Cover and cook well with saturated solution of "Brillant Reinbleu" 8G. extra (Bayer & Co., Leverkusen).
(6) Flush off and wash.
(7) Counterstain for 3 seconds in five-fold dilution of Ziehl's carbolfuchsin.
(8) Flush off, rinse and dry.

(*b*) For intestinal flagellates, *e.g.*, Trichomonas, the procedure is even simpler—fixing in Ruge's fluid and counterstaining are both omitted.

(1) Mix well the intestinal contents with agar solution (1 part agar to 500 parts water) at body temperature, and prepare smears of the mixture as thin as blood smears.
(2) Allow the smears to dry in air.
(3) The staining solution (2 gm. "Brillant Reinblue" 8G. extra in 100 cc. water) is now poured over the smear and slightly warmed for 1 minute.
(4) Flush off, rinse, dry and mount in liquid paraffin.

In these preparations, though the form of intestinal parasites is not well shown (pear-shaped Trichomonas, *e.g.*, being too round and flattened) all characteristic parts, sufficient for diagnosis—the nucleus, basal granules, the undulating membrane with its basal line and the fixed flagellum along its free margin, and the three small free flagella—are well shown.

2. Bresslau's—a surface stain, shows the form but not the internal parts. Opalblau, the stain used, is supplied by Grübler as a thick mass. It is well rubbed up with the material to be examined (intestinal contents, pus, etc.), and a fine smear of the mixture is prepared on a slide. The smear is dried by waving the slide in air. All protuberances appear light, all hollows blue in fine gradations so that a clear relief picture on dark-blue background results. The form, the flagella, the ventral depression of Lamblia show up well, and give a good diagnostic picture.

3. Riegel's—a vital stain with Chloroform-azur—is also a help in the diagnosis of intestinal Protozoa.

Manson's stain (medicinal methylene blue (Höchst) 2 pts., borax 5 pts., water 100 pts.) is shaken up with an equal quantity of chloroform. The dark, blue-red chloroform-azur solution is separated from the overlying watery methylene blue layer by pipette and filter, and a drop of this chloroform-azur solution is put on a coverslip to spread out and evaporate. A small drop of the material to be examined is put on a slide and the coverslip with stain film is put on and pressed down, and the preparation examined immediately under the microscope. Bacteria, especially the more active forms, stain purple to violet red forthwith, showing granular inner structure clearly. Then fine and coarser spirochaetes are seen moving about. Active amoebae show bacteria that they have taken up, and vacuoles with material in various stages of digestion. Trichomonas may show large red-stained inclosures; and Octomitus appears blue from the small stained granules in its substance. After five minutes, movement ceases. The staining remains longer, then fades and vanishes.

Two microphotographs accompany the paper. One shows *Trichomonas muris* stained after Ruppert; the other shows *Giardia-Lamblia intestinalis hominis* stained after Bresslau.

J. D. T.

CHIBA (S.). **Die Verwendung der trockenen Hitze bei der Herstellung von Vakzinen (Typhus-, Dysenteriebakterien und Choleravibrionen).** [The Use of Dry Heat in the Preparation of Vaccines.] —*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 79–93.

In this paper the author describes and tabulates various experiments which he carried out with one-year-old laboratory strains of *B. typhosus*, *B. dysenteriae* and *V. cholerae* to determine how heat may best be employed in the preparation of vaccines. In an introduction to these experiments he advises that in choosing or comparing vaccines one should bear in mind that (1) there must be no increase of the inoculated virus in the body of the inoculated; (2) there should be the least possible secondary effects; (3) definite protection should be conferred; and in his summary he states that :—

1. In the preparation of antigen, 24 hours' heating in a dry chamber at 55° C. is preferable to 1½ hours' heating in a water bath at 60° C. Using typhoid vaccine prepared both ways there was no difference in the agglutinin and bacteriolysin content produced in the serum of the inoculated animals ; while in either case their power to protect, and keeping properties, were practically the same ; but toxicity was shown, by experiments on mice, to be less in the case of that prepared by dry heat.

2. Cholera vaccines show no appreciable difference : but the author, under this heading, refers to his having used vaccines prepared by dry heat many times without disadvantage as a point in favour of his method.

3. With dysentery vaccines prepared by dry heat a higher immunity is more quickly produced in rabbits—an advantage in the preparation of dysentery serum for diagnostic purposes.

4. Dry heat is also recommended as being more easily applied. Further experiments with *B. coli* and gonococcus suggest the employment of dry heat in the preparation of other vaccines also.

J. D. T.

i. HARVEY (W. F.) & IYENGAR (K. R. K.). **Virulence of a Micro-Organism and its Dependence on the Culture Medium.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 726–729.
ii. —— & ——. **Virulence of the Organism as a Factor in the Efficacy of Prophylactic Vaccines.**—*Ibid.* pp. 730–735.
iii. —— & ——. **On the Immunizing Properties of Allied Organisms and Non-Specific Organisms.**—*Ibid.* pp. 736–739.
iv. —— & ——. **Retention of Virulence of a Micro-Organism kept in Sealed Culture.**—*Ibid.* Vol. 10. No. 1. pp. 190–191.
v. —— & ——. **The Influence of Age and Temperature on Bacterial Vaccines. Part II.**—*Ibid.* pp. 192–202.

i. This contribution, which the authors have made to the subject of virulence, "relates to experiments on immunity as a result of inoculation, which cover the ground of effect of age and temperature on antigen, the use of avirulent and virulent strains for immunization, rate of loss and rate of gain of virulence by cultivation on artificial media, the effect of immunization with allied organisms and the effect of immunization with wholly non-specific organisms." These are the subject matter of the various researches here grouped together.

The virus used was fowl cholera, and "the strain to which this note refers was originally a virulent fowl cholera (*B. avisepticus*) which was grown by weekly sub-culture on blood agar and upon ordinary agar for 12 months before being subjected to final test. The growth on blood agar—and this is a point to be noted in connexion with the explanation of virulence—was comparatively luxuriant, while that on ordinary agar was scanty."

[By their parenthesis the authors seem to suggest that their experiments support the view that virulence depends on " a capacity, under given circumstances, of rapid multiplication " rather than on " some inherent property which is not dependent on rate of multiplication."]

The conclusions they arrive at are :—

" 1. *B. avisepticus* is an organism whose virulence can be maintained fixed within small limits without animal passage, by sub-culture on blood agar, while its virulence is very largely lost by sub-culture on ordinary agar.

" 2. There seems some probability that *B. avisepticus* when sub-cultured on ordinary agar becomes ' fixed ' in avirulence."

ii. The virus used was fowl cholera and the experimental animals pigeons. Commenting on their experiments, the results of which are set out in tabular form, the authors point out that :—

" The bacillus of fowl cholera is not one of the organisms which is used in the prophylactic inoculation of human beings. Deductions therefore made from the results here obtained must be based on the argument for analogy when transferred to the case of man and other organisms. The pigeons, too, used in trial, are not immunized in the usual way by subcutaneous inoculation but by intravenous. They are in fact used simply as a means of measurement in life of response to prophylactic antigen and not specially as animals immunized with suitable doses. It is to be noted, however, that the intravenous method of medication used in the trials is not only efficacious, but has not brought about any disturbance of the subjects so far as it is to be gauged by the figures relating to weight."

The conclusions arrived at in regard to the bacillus of fowl cholera, and with reference to the method used in the trials are as follows :—

" 1. Protection [is] afforded by prophylactic administration of an avirulent organism to infection by the organism in its virulent condition.

" 2. The protection afforded by the avirulent strain bears the proportion in these trials to that afforded by the virulent strain of 9 lives saved out of 15, as against 10 lives saved out of 15. The difference shown between the two is only slight and may or may not be really in favour of the use of the virulent strain.

" 3. The response to inoculation of an avirulent strain in the shape of agglutinating power of the serum is the same both for the avirulent and the virulent strain. The same result holds good for the inoculation of a virulent strain."

iii. This research was conducted on exactly the same lines as the last.

" The organisms used were *B. avisepticus*, *B. cuniculisepticus* and *B. coli*, of which the first was the specific organism, the second the group organism, and the third the non-specific organism."

. . . . .

" In this set of experiments with pigeons and with *B. avisepticus* :—

" 1. The prophylactic use of the specific organism showed a great saving of life (15 animals out of 15) as compared with a control series in which there was great mortality.

" 2. The prophylactic inoculation of an allied organism, *B. cuniculisepticus*, showed no evidence of any greater saving of life than did the prophylactic inoculation of a wholly non-specific organism.

" 3. Distinct evidence of protection by the prophylactic inoculation of a non-specific organism has been demonstrated."

iv. The strain of *B. avisepticus* tested was the same as that referred to under i: and as a result of their experiments the authors conclude as follows:—

> "The virulence of a virulent culture of fowl cholera is maintained to the full when kept in a sealed tube at room temperature for at least 12 months."

v. In an introduction to their communication the authors mention that in the first paper on this subject by themselves and CHRISTOPHERS, which had reference to typhoid and cholera vaccines, they stated that "protection experiments would have greater cogency than those based on the production of agglutinins," and that "the present paper takes up this more important evidence." They also point out that *B. avisepticus*, which they used throughout this group of researches because it is definitely pathogenic to pigeons, which were easily obtainable in India, had a further advantage in this particular research in that, as a member of the haemorrhagic septicaemia group, it is related to *B. pestis.* They then refer to ROWLAND and STEVENSON's work on the keeping properties of plague antigen and the conclusions they come to, viz.: (1) immunizing power persists for longer periods than toxic power; (2) the protective power of plague antigen increases somewhat after its preparation; (3) hydrolysis of plague antigen can be carried out for some 2½ months at 37° C. without much evidence of reduction of immunizing power.

The methods adopted in the present research are fully explained, tables are given showing the experiments in full, a caution is sounded against hasty generalization, and, keeping strictly within the limits of their experiments, the authors conclude that:—

> "A fowl cholera vaccine does not deteriorate in antigenic potency with age or with subjection to the action of any temperature to which it is likely to be exposed, within six or nine months from date of preparation."

In the discussion that precedes the conclusions, the authors say that "at the end of 12 months appreciable deterioration has set in but protective power has not been wholly abolished." They are unable to say from actual trial if this protective power that remains at the end of 12 months is any greater than that which would be produced by a non-specific protein antigen, although the saving appears to be very much of the same order.

J. D. T.

HARVEY (W. F.). **Immunization or Response of Immunized Animals to a Small Dose of Antigen administered at a Long Interval after First Immunization.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 740–746.

The experiments carried out:—

> "consisted in the inoculation of 5 pigeons intravenously with the equivalent in suspension of 1 mgm. of dried bacterial typhoid antigen, and the examination of the serum of the pigeons first at 10 days intervals and then at 30 days intervals throughout a period of 12 months for agglutinin titre. At the end of the 12 months a series of doses of antigen ranging from the original dose of 1 mgm. down to 0·01 mgm. were administered intravenously to the 5 pigeons, one dose to each, and their serum tested at intervals of 3 days for the appearance of agglutinins and for agglutinin titre. As controls to the results obtained there were used for similar tests 5 pigeons which had received no antigen at all and 5 pigeons

which, not having previously received any antigen, received the same doses, 1 mgm. to 0·01 mgm., as the immunized pigeons."

. . . . . .

" The points which were to be elucidated by experiment were :—

" (1) Whether an animal once immunized remained an animal always differentiated from one which had not been immunized ?

" (2) Whether an animal once immunized was more responsive to the introduction or application of antigen than one which had not been so immunized ? "

As the author points out, " the number of animals used in the experiments here given are much too few to admit of any categorical answer to the questions."

His conclusions, based strictly on the experimentation recorded, are :—

" 1. The agglutination effect of intravenous inoculation of typhoid antigen in pigeons shows a diminution month by month after the inoculation. The drop is marked between the 10th and 20th day and very slow thereafter. The condition, so far as a 12 months' trial goes, seems to reach a constant low level, which is, however, higher than that of the uninoculated animal.

" 2. The introduction intravenously of a dose of antigen 1/10th to 1/20th smaller than the original dose and even smaller still, calls forth an agglutinin response in the 12 months' previously inoculated pigeons, which is significantly greater than that elicited in uninoculated pigeons receiving the same doses."

J. D. T.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1921. Nov. 17 & Dec. 15. Vol. 15. Nos. 5 & 6. pp. 141–155. With 1 plate.—**Laboratory Meeting.**

Methods demonstrated :—

" Major H. C. BROWN gave a demonstration of the results obtained in a method which, he hoped, would be useful in enriching the number of dysentery organisms in cultures from stools. . . .

" The method of enrichment consisted in adding a small quantity of homologous high titre serum to the mixture of organisms, and then plating out from the deposit after the agglutinated bacteria had had time to settle."

[This method, making use of " the elementary fact that agglutinated organisms are still alive and capable of growth," is much simpler and likely to be more effective than that advocated by CASTELLANI in which the non-pathogenic organisms " are sedimented by homologous sera and the supernatant fluid is plated out."]

" Professor Warrington YORKE and Dr. J. W. S. MACFIE showed :—

" A specimen of urine from a case of paroxysmal haemoglobinuria indistinguishable from that passed during an attack of blackwater fever ; and also specimens of blood from the same case, showing autolysis.

" The autolytic reaction is obtained as follows :—A small quantity of blood is withdrawn and immediately placed upon ice for five minutes, and then in an incubator at 37° C. for one hour. On centrifugalisation the serum is found to be red. No haemolysis occurs if the blood be not placed on ice before putting in the incubator, as the immune body present in the haemoglobinuric blood only unites with the red cells at low temperature. The maximum degree of haemolysis is obtained if the cooling be for from 5 to 7½ minutes ; when the period of cooling is prolonged the degree of haemolysis becomes less and less, until, if the cooling is prolonged for 60 minutes, the degree of haemolysis is only about 10 per cent. of that obtained when cooling is for 5 minutes only. The explanation of this paradox is complicated and depends on complement splitting.

"Tube 1.—Paroxysmal blood not cooled and put straight into incubator at 37° C. for 60 minutes. Result, no haemolysis.

"Tube 2.—Paroxysmal blood cooled for 5 minutes before putting into incubator for 60 minutes. Result, intense haemolysis.

"Tube 3.—Paroxysmal blood cooled for 1 hour before putting in incubator for 60 minutes. Result, slight haemolysis.

"N.B.—This reaction is not given by blood from blackwater fever patients. . . . . .

"Dr. C. M. WENYON gave a demonstration on a simple culture medium which he had employed for the cultivation of leptospira and protozoa. . . .

"The medium is prepared as follows:—To 270 c.cm. of 0·85 per cent. sodium chloride solution (Ph. 7·6) are added 30 c.cm. of ordinary 2 per cent. bacteriological nutrient agar (Ph. 7·6). When mixture has taken place, 10 c cm. are placed in each test tube. After autoclaving at 120° C. the tubes are cooled to 50° C., and into each tube are allowed to drop, from a rabbit's ear, 20 drops of blood. The tubes are not shaken nor mixed, and are incubated for twenty-four hours at 37° C. The medium is then ready for use. The blood is obtained from a rabbit by the paraffin method. The animal is enclosed in a box at one end of which is a round opening fitting the neck, through which the head projects. The ear is shaved over the marginal vein. The skin is sterilised with alcoholic iodine solution, and when dry is coated above, below and on the margin with hot melted paraffin, so that the area of operation is covered by a thin layer through which the vein is still visible. With a small sharp knife an incision is made in the marginal vein and the sterile blood allowed to drop from the paraffined margin of the ear into the tubes. After incubation of the blood agar tubes it will often be found that the blood has coagulated in a cylindrical column, leaving a clear agar medium around it."

Dr. Wenyon also referred to an egg medium in which a "culture of *E. intestinalis* was first obtained by Hogue (1921)," and which "has also given good results" in his (Dr. Wenyon's) hands.

"The egg medium is prepared as follows:—Locke's solution is first made; sodium chloride, 1·8 grams; calcium chloride, 0·048 grams; potassium chloride, 0·084 grams; sodium bicarbonate, 0·04 grams; distilled water, 200 c.cm.; to this solution is added one whole egg which has been well whipped. After thoroughly mixing, the solution is steamed for fifteen minutes over the water bath, with constant stirring, and is then filtered through cotton-wool. About 5 c.cm. of the filtrate is then placed in each test tube. After autoclaving at 120° C. the tubes are ready for use."

J. D. T.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 16–24.—**Laboratory Meeting.**

1. The Dreyer and Ward Modification of the Sachs-Georgi Reaction applied to the Diagnosis of Framboesia. [By Lieut.-Colonel H. MARRIAN PERRY.]

"A practical demonstration of the Dreyer-Ward modification of the Sachs-Georgi flocculation reaction (the Sigma Test) was given. Attention was directed to the advantages of the Dreyer-Ward technique, and to the fact that, although originally designed as a diagnostic test of infection by *Spironema pallidum* it could be employed with equally reliable results in infection caused by *S. pertenue*.

"Through the kindness of Capt. N. T. WHITEHEAD, Gordon Memorial College, Khartoum, opportunity had recently been afforded of testing the serum of a series of cases of framboesia by this method; in each serum examined the result was strongly positive.

"The possibility of quantitatively estimating the effects of treatment on the flocculation titre of the serum in any particular case was illustrated by a graph compiled from the results of repeated tests undertaken in a case of secondary syphilis.

"The advantages, under conditions of tropical practice, of a test of this nature, obviating, as it does, the employment of a haemolytic system, is apparent."

[A full account of the Sigma Reaction of DREYER and WARD applied to syphilis is given in "The Practice of Medicine in the Tropics," Vol. 2, pp. 1676-1682; see also *Lancet*, 1921, May 7, p. 956.]

2. Bleaching Powders suitable for Tropical Use.—Demonstration by Major S. ELLIOTT.

"An intimate mixture of 80 parts of bleaching powder and 20 parts of freshly-ignited quicklime forms a dry powder, which is hardly affected by the heat and moisture of a tropical climate. In addition, no rusting of the inside of the tin occurs. Samples sent to West Africa, and stored there under ordinary conditions for six months, showed a loss of only 1 per cent. of available chlorine, and were exhibited together with a tin of ordinary bleach. The latter had been stored in Egypt for six months, and contained less than 0·1 per cent. of available chlorine.

"The United Alkali Co., Ltd., St. Helens, Lancashire, appear to be the only firm manufacturing this 'stabilised bleach' at present."

3. Phenol Red: an Indicator in Culture Media. By Major H. C. BROWN.

"*Phenol Red Milk*:—

"One volume 'Ideal Milk,' four volumes tap water.

"Add sufficient phenol red to make the diluted milk bright yellow.

"Add alkali until mixture is brick-red.

"Tube and steam twenty minutes on three successive days.

"*Phenol Red Sugars*:—

"One per cent. sugars in 2 per cent. peptone solution with phenol red substituted for litmus.

"The advantages of phenol red over litmus as an indicator for milk and sugar media have been fully dealt with by Major BROWN in the *Lancet*, 1922, Vol. 1, p. 842."

4. Agglutination Response following Inoculation of a Polyvalent Vaccine, consisting of *B. typhosus*, *B. paratyphosus* A, B and C.

Major J. A. MANIFOLD and Captain W. W. PRATT, R.A.M.C., having carried out experiments, "with the object of ascertaining whether the agglutinin response to the T.A.B.C. vaccine was satisfactory," conclude:—

"In all cases the agglutination titre of the serum to *B. paratyphosus* C was high, and the response to the T.A.B. antigens unimpaired. The reactions, both local and general, following inoculation with the vaccine, were not more severe than is usual in the case of the ordinary T.A.B. vaccine."

5. A Method of Mounting Fleas for Rapid Identification. (Shown on behalf of Major F. W. CRAGG, I.M.S.)

"A thin layer of Carana [Canada] balsam is spread on a slide and dried overnight in the incubator. The fleas, picked up in forceps and similarly orientated throughout, are laid on the slide in five regular rows of ten fleas per row. A coverslip is moistened with xylol and gently lowered on to the slip. The fleas can be arranged as regularly as a series of sections, and much time is saved in examination."

6. Mass Diagnosis in Ankylostomiasis.

Lieutenant-Colonel Clayton LANE showed a graph illustrating " the area of the microscopic preparation required for a positive diagnosis of ankylostomiasis in (i) the standard West Indian technique, as used in Jamaica during 1919, namely, about 36 sq. in. ; (ii) LANE's levitation and KOFOID and BARKER's brine loop technique, namely, 2 sq. in. ; (iii) a new technique of LANE's employing complete comminution and centrifugalisation in water following centrifugalisation in salt solution at a specific gravity of 1,200, namely, ⅛ sq. in. A microscopic preparation showed the great concentration of ova obtained by the new technique from 1 cc. of stool."

J. D. T.

v. GUTFELD (Fritz). **Erste Massnahmen bei Laboratoriumsinfektionen.** [First Measures in Laboratory Infections.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Jan. 31. Vol. 87. No. 7–8. pp. 545–553.

This paper deals with the means of aborting infection contracted in the laboratory, or of mitigating its effects. In such the micro-organism concerned and the time of infection are usually known. The infection may be dealt with at the portal of entry during the incubation period, and if and when micro-organisms are excreted. Excretion of micro-organisms may follow infection without intervening illness, and it may not be demonstrable either during or after illness. In this paper the author deals with the destruction of micro-organisms at the portal of entry. He mentions three such portals, viz., the skin, the conjunctival sac, and the gastro-intestinal tract, and discusses measures applicable to each.

Skin lesions should never be sucked ; they should be allowed to bleed freely, or, in the case of small lesions which do not bleed, should be cauterized as deeply as possible with tincture of iodine or fuming nitric acid. Infection of the conjunctival sac may entail infection of the nose and intestinal tract. Organisms which act locally only can be killed with fair probability by the instillation of a 1 per mille solution of oxycyanate of mercury several times repeated : the process is chiefly mechanical. The effect may be kept up by introduction of 1 per mille of the same substance in vaseline. If it is important to prevent the organism penetrating into the tear duct, blowing of the nose must be avoided, as thereby fluid is drawn from the conjunctival sac.

The most frequent cause of diseased organisms reaching the alimentary tract is the use of ordinary pipettes. Should infective micro-organisms be drawn into the mouth, the first obvious precaution is to spit into a bowl of sublimate solution, which should always be at hand. The mouth should be washed out repeatedly with 0·2 per cent. HCl or 1 in 4,000 pot. permang., and about 150 cc. of the HCl solution should be drunk immediately and once or twice again in the course of the next hour. The author is against the use of alcohol.

The measures to be taken in the event of infection with the bacilli of enterica, dysentery, cholera, diphtheria, pus organisms and syphilis are then considered in turn. [Undulant fever is not mentioned.]

Enteric bacilli may be introduced through the conjunctival sac, nose, mouth or skin lesions. If the former, the treatment for a mouth infection should be followed as well. A protective inoculation should always be made. If no vaccine is ready there is time to prepare one from the strain concerned, if the preparation is started at once. The subject should be kept under observation for at least two weeks and the stools and urine should be examined bacteriologically for a longer period. Infection through wounds is extremely rare.

The precautions for dysentery are the same as those for enteric, omitting the prophylactic inoculation.

In the case of cholera vaccination is contra-indicated, for the incubation period is much too short. For the protection of his fellows the subject must be isolated at once. If after five days he is without symptoms and three examinations of the stools have not revealed vibrios all is well. Naturally the same toilet as for typhoid is made at the time of infection. The author gives the following list of the remedies which he thinks should be kept at hand in every laboratory :—

1. A brown litre flask of 1/1,000 oxycyanate solution.
2. A small porcelain or stoneware jar (10 gm.) of 1/1,000 oxycyanate vaseline.
3. A small flask (20 cc.) tincture of iodine.
4. ,, ,, ,, Lugol's solution.
5. ,, ,, (5 cc.) fuming HNO_3.
6. A litre flask of 0·2 per cent. HCl.
7. ,, ,, 1/4,000 pot. permang.
8. Some glass rods and eye pipettes, wrapped in paper to protect from dust.

A. G. B.

Vervoort (H.). **Over het conserveeren van organen voor het onderzoek op Pest.** [On the Preservation of Organs for Plague Examination.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 224–225.

The following prescription (of Broquet, *Ann. de l'Inst. Pasteur*, 1910, Vol. 24, p. 890) is recommended for preservation of organs of man or animals for biological plague diagnosis :—

Under aseptic precautions the tissue is put in a bottle of 150–200 cc. capacity, which is filled up with glycerine (neutral) 20 parts, distilled water 80 parts, carbonate of calcium 2 parts, and well corked.

The author kept the organs of a plague guinea-pig for nine days at room temperature, after which he was able to show the plague infection biologically by injecting an emulsion of the organs into another guinea-pig.

W. J. Bais.

Senevet (G.). **Emploi de l'alun de fer pour le nettoyage des lamelles dévitrifiées.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. p. 337.

Coverslips which have been kept too long in the tropics often become of a milky appearance as the result of partial devitrification ; they are then useless. The author recommends soaking them for a few seconds to several hours in a 3 per cent. solution of iron alum. The two faces are then rubbed with the thumb and index finger moistened with the solution. The more pronounced the opalescence the longer the soaking and the more rubbing required. Dry without washing on a fine linen rag. The author has preparations eight months old made with slips which have been so treated and have suffered no further change.

A. G. B.

WALRAVENS (P.). **Note concernant l'activité alexique du sérum de lapin.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 165–167.

According to the author of this note, the alexic activity of the rabbit's serum is influenced by time quite differently from that of other animals. Its activity, almost negligible at the time of bleeding, increases progressively for several days. After the fourth day it diminishes, and is progressively lost.

J. D. T

UNNA (P. G.). **Das Wesen der Giemsa-Färbung.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 159–164.

This is a highly technical paper dealing with the chemistry of the characteristic nuclear staining element in Romanowsky stains known by Nocht's term "Rot aus Methylenblau." The author discusses its derivation from methylene blue, and the synthesis of methylene blue itself.

J. D. T.

WORDLEY (E.). **Further Results on the Isolation of Organisms from Faeces by a New Method.**—*Jl. of Hyg.* 1921. Dec. Vol. 20. No. 4. pp. 360–362.

The author has already described this method [see this *Bulletin*, Vol. 19, p. 84.]

It is stated to have been found constantly superior to all others in isolating organisms both from faeces and from sputum.

A. A.

SPRUE.

ASHFORD (Bailey K.). **Observations on the Conception that Sprue is a Mycosis superimposed upon a State of Deficiency in Certain Essential Food Elements.**—*Amer. Jl. Trop. Med.* Baltimore. 1922. Mar. Vol. 2. No. 2. pp. 139–150.

In this paper Ashford summarizes his experience of sprue in Porto Rico; from 1908 up to the end of 1921 he has studied over 1,000 cases. His main contention is that sprue is a mycosis superimposed upon a food deficiency and that the pathogenic agent is *Monilia psilosis*, an organism claimed to be quite distinct from *Monilia albicans*. His conviction is so sincere that he is led to remark, if *Monilia psilosis* is not the direct cause of tropical sprue why should *Monilia albicans* be considered the cause of thrush? Typical sprue is most frequently preceded by a physiologic glandular deficiency recognizable by a deficiency syndrome in which pallor, lassitude and gastro-intestinal derangement are prominent symptoms. In this condition, he thinks, there is a marked reduction in the output of the digestive glands, particularly of the pancreas and intestinal glands, resulting in a change in the composition of the intestinal contents which become highly acid. Here the pathogenic agent—*Monilia psilosis*—finds a congenial medium in which it can multiply and produce the typical disease, sprue. The same train of events seems to occur in thrush, the cause of which is universally recognized as *Monilia albicans*. The latter is a disease of infants and old people suffering from marasmus or avitaminosis. In this condition rapid proliferation with membrane formation occurs on the tongue and primae viae.

When one considers the claim to specific rank which *Monilia psilosis* holds and the frequency and consistency with which overwhelming infections of active cases of sprue with this organism occur and the mass of laboratory, clinical and epidemiological evidence, the conclusion is almost inevitable that *M. psilosis* is the cause of the disease.

P. H. Manson-Bahr.

FISCHER (Walther) & VON HECKER. **Beitrag zur Kenntnis der Sprue.** [Contributions to the Knowledge of Sprue.]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1922. Mar. 28. Vol. 237. No. 3. pp. 417–448.

This paper is based upon elaborate histo-pathological studies of a fatal case of sprue in Bonn. The man had lived for many years in China. Since 1902 he had suffered from a more or less chronic dysentery, and true sprue symptoms began in March, 1919, in Sumatra. He died in August, 1921.

At autopsy the main interest centred in the intestinal canal. In the mucosa of the lower jejunum and in three places in the ileum small ulcers of linseed-size were found. They were of considerable depth, penetrating to the longitudinal muscular coat; their margins were rolled, not undermined. In the caecum were found 20 dark red or greyish patches in the mucosa, and there also the gut wall was attenuated. Sections of the ulcers revealed little of note; the superficial epithelium was entirely lacking and the ulcerations extended into the circular muscular coat; their base was formed of granulation tissue with fibroblasts, lymphocytes, plasma cells and sparse eosinophiles. The underlying muscular fibres were heavily pigmented. The stroma at the edge of the ulcers was packed with eosinophiles, while the submucosa was oedematous. No micro-organisms were visible in the tissues. It is interesting to note that similar ulcers in the same situation have been recorded. The atrophy of the gut—the so-called "psilosis"—would appear to be an artefact, a product of post-mortem decomposition; it should be regarded as a secondary phenomenon, due to the chronic distension of the bowel wall with gas, and not directly connected with the primary sprue process. The microscopic appearances of the pancreas were normal. The liver presented a picture of brown atrophy, a condition apparently customary in sprue, a considerable haemosiderosis is present, and, on the other hand, few signs of fatty degeneration. Changes in the bone marrow resembled to a certain extent those of pernicious anaemia—such as, a well-marked haemosiderosis, an excess of eosinophilic myelocytes. A marked haemosiderosis was present in most organs (especially liver, spleen and mesenteric glands), and may be significant of the magnitude of the blood destruction in this disease. The blood picture was that of a severe anaemia (red cells 2,200,000; hyperchromasia colour-index 1·3); there was moderate poikilocytosis, and a normal leucocyte count. Arneth index estimation showed a "shifting of the index to the right."

A *haemochromatosis* of the bowel is present as well. This pigment differs from haemosiderin; it is present in the muscular coats, as well as in the mucosa and submucosa; it is of fatty nature, insoluble in acids, and is bleached by bleaching reagents, such as hydrogen peroxide and stains feebly with Sudan III; it is probably lipofuscin, and may be indicative of a localized lesion of the intestine. Careful search of the intestinal lesions failed to demonstrate any yeast cells or mycelium, and the authors conclude that when present they represent merely a secondary invasion. In conclusion the opinion is expressed that very intimate association exists between amoebic dysentery and sprue; the geographical distribution of sprue corresponds in a remarkable manner with that of severe amoebiasis, and clinical experience has shown that amoebic dysentery is an almost invariable precursor of sprue.

P. H. M-B.

GOLDSMID (J. Albert). **A Case of Sprue in New South Wales.**—*Med. Jl. Australia.* 1922. June 10. 9th Year. Vol. 1. No. 23. pp. 636–637.

The case here reported is undoubtedly one of sprue in the early stages, the author being convinced that sprue, as well as ankylostomiasis occurs in New South Wales, and as to the latter assertion he has already proved himself to be correct. This is the first instance of sprue he has seen during 25 years' practice on the Tweed River. The patient is a lady, 25 years of age, who complains mainly of soreness of the right side of the tongue; she suffers from epigastric tenderness, passes typical diarrhoeic stools, and has lost 10 lb. in weight during a month.

P. H. M-B.

CASTELLANI (Aldo) & BROWNING (K. C.). **An Ethereal Extract of Strawberries for the Treatment of Sprue.**—*Brit. Med. Jl.* 1922. May 6. p. 718. With 1 fig. in text.

The favourable influence of a strawberry diet on sprue and the difficulty in procuring suitable berries out of season led to attempts to isolate an extract from this fruit, based upon the experiments of ZILVA on the alcoholic extraction of antiscorbutic and antineuritic principles from cabbages and carrots. Fresh strawberries were crushed with 5 per cent. of their weight of absolute alcohol and filtered in a powerful filter press; the juice was then extracted for days in a continuous ether extraction apparatus. The ethereal extract was immediately concentrated in a vacuum over phosphorus pentoxide, a small quantity of either starch or lactose being added. The residue was dried as completely as possible in a vacuum over phosphorus pentoxide. The extract mixed with starch is of a dark red colour, has a granular scale-like appearance, and bears a fragrant smell of fresh strawberries. Clinical investigation has been so far limited, but when tried with usual milk diet and alkaline treatment in 5 gr. doses three or four times a day it seemed to have a beneficial effect. [Such an extract is prepared by Messrs. Martindale, see p. iii of the advertisements.]

P. H. M-B.

ASHFORD (Bailey K.). **La carencia de ciertos elementos alimenticios como causa predisponente del espru, pelagra y beriberi en Puerto Rico.**—*Bol. Asoc. Med. Puerto Rico.* 1921. Dec. 31. Vol. 15. No. 134. pp. 249–259.

MISCELLANEOUS.

BONREPAUX. **Fonctionnement du Centre d'Orthopédie de l'A.O.F.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. July & Aug.-Sept.-Oct. Vol. 3. Nos. 17 & 18. pp. 117–121; 125–129.

The Orthopaedic Centre of Dakar, French West Africa, was established in 1918 to supply apparatus, and teach its use, to native soldiers mutilated in the war. Expert hospital treatment was available, but the most difficult matter was to organize proper supervision of those who had returned to their homes in far distant villages; and to improvise from stores of appliances and spare parts devised for white soldiers in France, the simpler apparatus that alone could be of permanent use under semi-civilized conditions. Whilst craftsmanship is available locally, so far very little success has attended efforts to utilize the indigenous woods, though experiments are being made. Leather, too, produced in the colony is insufficiently tanned.

The work has progressed so satisfactorily that in 1921 more than 2,000 amputees were under supervision in the colony. Of this number a third were cases of partial amputation of the foot, and the results from the orthopaedic point of view were no more satisfactory than those in other parts of the world. Neither CHOPART nor LISFRANC were primarily concerned, as surgeons should be nowadays, with the physiological value of the part remaining. Hence many of the stumps at Dakar have had to be, as the author diplomatically says, "retouchés" by the surgeon.

"Parade" arms, often enough discarded by amputees even in cities, are altogether out of place in the wilds, and elaborate appliances for the lower limb are generally not durable enough for the climatic conditions. As a rule a simple rigid pylon is most satisfactory to the patient, and, if articulated, serves every purpose. Cases of Chopart, Lisfranc and Pirogoff amputations in sandy country are best fitted with "elephant" boots. The moral of the article is that an "African" prosthesis should be extremely simple, comfortable, strong, stable, safe, made of very resistant materials, and easily replaced.

E. Rock Carling.

VAN LOON (F. H.). **An Investigation into Mental Fatigue with Batavia School Children.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1922. Part I. pp. 25–46. With 5 charts.

The writer states that, for some years, educationists in Java have feared lest, in tropical countries, the customary hours of school may be too long, and may even be causing grave over-pressure in the children. Enquiries and circulars addressed to teachers on this subject have, however, led to dubious or inconsistent results. Dr. Van Loon, therefore, has endeavoured to investigate the problem by the objective methods of experimental psychology.

He has chosen for his experiments WIERSMA's method of measuring fatigue—the cancellation of a given group of dots (say, all groups of four) from a page containing numerous groups of three, four and five. His chief conclusions are as follows:—

Serious symptoms of over-pressure were nowhere found. The children of Batavia show practically no greater fatigue than the

European children tested by the same method in Groningen. His main results, however, are obtained with older children; and he considers that in the tropics the five-hour day is probably too long for children under seven. Girls, he finds, show if anything less fatigue with this test than boys. The Eurasians appear to fatigue less easily than the natives. Holidays prove most refreshing to those children who can spend their vacations in the hills. Where a holiday means simply lessened regularity of living—of hours of sleep, meals and occupation—it may prove detrimental. Fatigue was least in agricultural and technical schools, where practical and theoretical instruction is given alternately. It was greatest with nervous and delicate children. The investigator adds that it would be instructive to "repeat the experiments with children suffering from chronic malaria, and from the under-feeding so commonly found in many schools in tropical countries."

[These conclusions are quite consonant with the more recent findings of experimental psychology in other countries. It is, however, to be observed that further enquiry often shows that fatigue is not necessarily non-existent where the test employed fails to reveal it; and, further, many psychologists would not agree that the test selected was the most effective for the purpose.]

Cyril Burt.

Le Dantec. **Traitement opératoire des grands éléphantiasis du scrotum.** —*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. May. Vol. 1. No. 1. pp. 16–21.

The author, who is Director of the School of Medicine of French West Africa, at Dakar, states that elephantiasis of the scrotum is common in that colony, and that when, as the result of successful surgical intervention in one or two cases, a hospital has acquired a reputation, sufferers from this infirmity come in from far and wide to claim relief. It is consequently very desirable to increase the number of centres where such relief can be obtained, and, as a first step in this direction, he rightly thinks it necessary that medical men should realize that removal of even the largest elephantoid tumour of the scrotum is quite a simple procedure. With this end in view, and without laying any claim to originality, the author proceeds to describe the method and technique practised by himself and recommended in their general lines for adoption by others.

Stated briefly, his method differs from those more usually favoured in the fact that the use of the elastic tourniquet is dispensed with, and that the first incision is a median one whereby, after liberation of the penis, the tumour is divided into two lobes, which are dealt with separately. This incision commences at a point midway between the symphysis pubis and the preputial orifice, surrounds that opening, and continues along the median raphé of the scrotum until healthy skin is reached in the perineal region. The upper part of the incision is then deepened and the penis liberated, the inner lining of the prepuce being preserved. The lower portion of the incision is then continued deeply along its whole length between the testes, and the tumour with a few touches of the knife, almost by a process of cleavage, is divided into two lobes. The testes are then in turn liberated from the loose blubbery tissue in which they are imbedded, the operator working in each case from the inner side. If hydroceles are present the sacs are excised. The cords are followed upwards and freed as far as the external abdominal rings. Testes, cords and penis are raised and placed in a position of safety upon the abdominal wall. The lobes of the tumour are then amputated, separation being effected from within outwards until the skin is reached, a method which permits of recognition of the larger vessels and their division between haemostats without loss of blood. These larger vessels are usually few in number, and those of smaller size are easily dealt with subsequently. The lines of skin division will, as in other operations for elephantiasis of the scrotum, vary with the amount of healthy integument available, and if flaps can be formed to provide covering for the testes they are not necessarily symmetrical. The penis is enveloped in a flap raised from the skin below the pubis and stitched by its lower margin to the reflected preputial lining.

From this procedure the author claims satisfactory results, both immediate and ultimate. Haemorrhage is reduced to a minimum, and the bulk of the tumour, by its division into lobes, ceases in the case of the larger growths to be an obstacle to rapid performance of the operation, even in the absence of more than one available assistant. He regards the method as a simple one, capable of being carried out by any operator, and well suited to the generality of cases, though not necessarily always the best.

[The procedure is not altogether new, as indeed the author points out, having previously on occasion been applied in part to tumours of moderate size with no implication of the penis; perusal of the paper in the original will convince most surgeons that the suggested extension of its scope is justified.]

J. J. Pratt.

CHATTERJI (K. K.). **Radical Cure of Hydrocele by Plication and Overlapping of Tunica Vaginalis with Statistics of 225 Cases.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 209–210. With 1 text fig.

The author is of opinion that both the method of excision and that of eversion of the sac disregard the lessons of nature, which rather suggest cure by adhesion.

The operation for procuring adhesion is fully described and figured. The essentials of it are after exposing the sac, to carry a full length incision through it. After roughening both its visceral and parietal layers one half of the sac is drawn across the testicle, lying *in situ*, and fixed by sutures along the line of reflexion of the tunica vaginalis; and then the same thing is done with the other half, allowing it to cover and overlap the first half. If the sac be large it can be folded in pleats; if very large the unrequired redundancy can be cut off. Two hundred and twenty-five cases are all returned as cured.

A. Alcock.

JOUVEAU-DUBREUIL. **La variolisation au Setchouan.**—*Bull. Méd. Franco-Chinois.* Pekin. 1921. Aug.–Dec. Vol. 1. Nos. 3 & 4. pp. 139–142.

The author tells us that under the Sung dynasty in A.D. 1022 the prime minister, Ouang Tan, having lost several sons from smallpox, and having learned that preventive inoculations were practised on a neighbouring hill, had a son inoculated who escaped the disease, whereby the method became speedily popularized.

To the Chinese smallpox is a natural phenomenon, the expulsion of the impurities which have accumulated during intra-uterine life;

this expulsion is essential, should take place as early as possible, and is provoked by variolization. Dried crusts are taken from inoculated children who have had a mild attack. They are kept in a cool place, during the hot weather in the hills. The crusts are either broken up with a little milk or water and introduced into the nostril on a tampon which is left in place for 12 hours, or powdered, in which case the powder is blown into the nose by means of a hollow bamboo or the rachis of a goose feather. Medicine is given on stated days and the diet is carefully controlled, so that the operation is costly. Another method has been introduced since the coming of European vaccination. Crusts are collected from vaccinated children, preserved dry, and used suspended in water or milk either by the nose or by small scarifications of the arms. Notwithstanding these methods and vaccination, smallpox is common. Of 535 persons taken haphazard 61 had pocks on the face, or a proportion of 11·4 per cent. Inquiry showed that of 200 persons 93 were inoculated or vaccinated between one and five years of age, and 68 between five and ten, and this delay helps to keep the disease endemic. Vaccination is done only in certain months and many days of these are unlucky. Leap years are unfavourable. Owing to the hypothesis of the nature of the disease the process is never repeated. There seems to be no recognition in China of the contagiousness of smallpox.

A. G. B.

BAUS. **Note contributive à l'étude des flèches au strophantus (Haut Dahomey).**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. Oct. Vol. 1. No. 3. pp. 34–37; and 1920. Mar. Vol. 2. No. 3. pp. 74–80.

During the military operations in Borgu and Atakora, Upper Dahomey, in 1916–17, the author had occasion to study 92 cases of wounds by arrows poisoned with *Strophanthus hispidus* used by the Baribas tribe. The arrows are slender reeds, 40–60 cm. long, ending in iron heads of various shapes. These are, we are informed, made by the native smiths from Government telegraph wire. The quivers, of goat skin, hold 15 to 200 arrows and contain the solution of Strophanthus to a depth of 10 centimetres, described as blackish and of tarry consistency; in this the arrow heads rest. Between the receipt of the wound and the onset of symptoms is a period varying between ten minutes and one and a half hours, commonly about one hour. Prodromal signs are muscular weakness, which is felt in the less severe cases after about half an hour, and irregularity of pulse. The symptoms in fatal cases are detailed: the chief are tremors, clonic convulsions, and dyspnoea, each of rhythmical recurrence. Of the 92, 37 survived; in them the convulsion stage was never reached The basis of treatment was tannin, which the author found experimentally never to fail, but its efficacy depends on the rapidity with which it is brought into use. After failures due to a delay of a few minutes the most exposed of the native troops were provided with saturated tannin solution in quinine-tablet flasks. The author does not approve of removal of the arrow by counter incision, on the ground that it exposes more tissue to the poison. He cuts down on the arrow head and applies the tannin solution, or the patient does this immediately after tearing the arrow out. He doubts the value of ligating a limb. Nothing is said of the way in which the natives prepare the poison.

A. G. B.

LOUYS (G.). **La dépopulation dans la basse Côte d'Ivoire. Campagne médicale.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. July & Oct. Vol. 2. Nos. 7 & 8. pp. 207–212; 241–247.

The author has made a study of the causes of the decline in population in the Lower Ivory Coast and suggests remedies. One is struck, he remarks, by the small number of children and their ailing and stunted appearance. The villages contain crumbling houses with masses of debris, where formerly there were habitations. Clearings have been abandoned for want of hands to cultivate them and have relapsed to jungle. In the midst of plenty of exploitable products the people perish. On his tours he has collected figures of birth-rates, infantile mortality and still-births, which he gives in tabular form. Of 569 " young " women who were interrogated, 242 had borne one child only and in 63 instances this was dead. The proportion of children to 100 women was 87·5. He classifies the factors which reduce the vitality of a race as social—induced abortion and alcoholism—and medical—faulty hygiene and disease. The chief causes in Dahomey are alcoholism, due not to trade spirit but to palm wine, and syphilis. Malaria is not an important factor. The author says that all the malarial attacks which he has seen in natives have been in persons long in contact with Europeans, and that if the native child is the chief reservoir the European is the chief agent of spread (*colporteur*).

Syphilis is believed to affect largely the infantile mortality. Among the children that survive signs of congenital syphilis are common—enlargement of liver and spleen, bony changes, dental irregularities, old iritis lesions, and large ulcers which disappear with antisyphilitic treatment. Primary sores are often masked by phagedena, secondary ulcers by dermatomycoses.

In the last part of the paper is described a medical campaign, the object of which is to draw up a complete inventory of native morbidity, with vaccination and revaccination of all, ascertainment of the malarial index with the necessary measures of prevention, the discovery of tuberculosis cases, the discovery and isolation of persons infected with leprosy and sleeping sickness, the discovery and treatment of syphilis. Permanent records are to be made of all the inhabitants of each village, and it is calculated that 1,600 persons can be thus examined per month or, with trained personnel, 2,000. [One may take leave to doubt whether there are enough medical officers in these vast primitive countries to put such a scheme into execution.]

A. G. B.

BAUJEAN. **Phlegmons à pneumocoques avec réactions articulaires simulant le rhumatisme.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. July. Vol. 2. No. 7. pp. 186–187.

A native soldier was admitted to hospital for " acute rheumatism." There was great swelling of the shoulder, elbow and knee on the right side, with much pain and high fever. The swelling affected the thigh as well, where was a chain of painful glands. There was cough and congestion at both bases. Salicylate had no effect, and a fortnight later the state was unchanged save that the arm was swollen. Later there were signs of suppuration here, and pus was let out containing pneumococci. Puncture of the knee joint brought away cloudy serum with red cells and pneumococci. Later an abscess was opened above the knee, also containing the pneumococcus. Ultimately the patient succumbed.

A. G. B.

DE LANGEN (C. D.). **Het uitzenden der buitenlandsche artsem en de onde en nieuwe salaris regeling bij den burgerlijken geneeskundigen dienst in Nederlandsch Indië.** [Alien Physicians for Dutch East Indies. Comparison between the Old and New Salary Regulations.]—*Nederl. Tijdschr. v. Geneesk.* 1921. June 4. Vol. 65. (1st Half-year.) No. 23. pp. 3064–3072.

As there was a great shortage of officers in the medical and public health service in the Dutch East Indies and as there were practically no applicants from the members of the profession in Holland, this led the Government to appoint 50 alien physicians, who had not Dutch qualifications. This naturally gave rise to many protests. Consequently the salaries for these services were considerably increased and only those with Dutch qualifications are to be accepted.

T. Joekes.

JOUENNE. **Sur le fonctionnement de la Polyclinique de l'Hôpital Indigène, depuis sa fondation en 1918, jusqu'au ler janvier 1920.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Apr. Vol. 3. No. 14. pp. 60–69.

The Polyclinic of the Native Hospital at Dakar was founded in 1918 at the same time as the Medical School [see this *Bulletin*, Vol. 17, p. 218]. It has been progressively successful and was visited in 1920 by 2,621 patients. Here the native students of medicine and midwifery get their instruction and learn to keep records on a system which is described at some length.

In the two years under review *syphilis* has been the most prevalent disease. The author hopes to banish it by the medical supervision and thorough treatment of prostitutes. Typical chancres are rare, they are nearly always phagedenic, and the secondaries are often severe. *Tuberculosis* comes next in frequency. The soil is virgin and the disease is spreading in the bush as well as the town. It has been favoured by the influenza epidemic as well as the recent high cost of living. The average number of people in one room is three, and the bachelors live under still more crowded conditions. The author thinks that in the combating of this and other infectious diseases we are tender to the individual at the expense of the race. All forms are found and the disease becomes readily generalized.

Another common complaint is *uterine inflammation*, attributable to the frequency of gonorrhoea and puerperal sepsis. Uterine prolapse, the result of perineal tears and vesicovaginal fistula, is far from rare. In the bush these cases are rarely seen, but at the clinic, in consequence of the examinations being made by the female students, it is easy for the doctor to use the speculum and give the necessary treatment. Menstrual troubles are a frequent source of complaint. The knowledge of these affections among native women is due to the midwife pupils; formerly there was no such thing at Dakar as gynaecological practice. Operations on women at the Native Hospital are now becoming more frequent: in 1917 there were only 3, in 1920, 37.

Vincent's stomatitis at its classical site behind the last molar is common; the fusiform-spirillary association is usually found. Local treatment with novarsenobenzol is effective. Many cases of *epulis* have been seen. The *tumours* seen so far have been primary cancer of the liver and bony tumours of the lower maxilla. *Ankylostomiasis*, *vesical* and *rectal bilharziasis* and *haematochyluria* are common. The great relative frequency of *mycetoma* with red and black grains is noted. Many such cases are sent to hospital with the diagnosis of tertiary syphilis or chronic osteitis. It occurs in various parts of the body, and appears to have its origin outside Dakar.

A. G. B.

BAUS. **Note sur un cas de rupture de la rate, nécropsie.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Jan.-Feb. Vol. 3. No. 11-12. pp. 12-13.

A native, in a quarrel, gave his adversary some violent blows, then put his hand on his left side, tottered, fell and died in a few minutes. He himself received no blow. The spleen, which was enlarged to 700 gm., had three rents and the peritoneal cavity was flooded with blood. The liver was cirrhosed. It was surmised that the violent muscular contractions caused sudden compression of the spleen.

A. G. B.

SEN (D. N.). **Addendum to Auto-Haemic or Auto-Serum Therapy.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 326-328.

The author's methods of " auto-haemic " therapy [see this *Bulletin*, Vol. 18, p. 141] are here more fully described. The ordinary serum, or the defibrinated blood, or the haemolysed blood of the patient may be used—in every case, of course, under strict aseptic conditions throughout.

In the process of haemolysis 0·5 cc. of blood is well mixed with 10 cc. of fresh-sterilized distilled water and the mixture is incubated (a thermos flask will serve in the absence of an incubator) for 24 hours at 42° C.; the supernatant fluid, after its asepsy is verified, is used for injection, beginning with a dose of 1 cc., and increasing the several successive doses by 1 cc. up to a maximum of 5 cc.

The serum is used in the same dosage; but for the defibrinated blood—which of course must be filtered before use if injected intravenously—the doses are double.

Instead of ordinary blood-serum, serum may be obtained by blistering the patient, or if there be ascitic or pleuritic fluid, they may be used.

" The consensus of opinion is that the auto-haemic treatment has been well tested in functional and metabolic disorders and has proved of much value; whereas in bacterial diseases how far it is efficacious has not yet been fully determined."

A. A.

NEWHAM (H. B.) & DUNCAN (J. T.). **A Note on the Arneth Count in Malaria and Dysentery.**—*Jl. Trop. Med. & Hyg.* 1921. Dec. 1. Vol. 24. No. 23. pp. 301-303. With 10 charts.

Seeing that authorities do not agree on the normal Arneth count, the authors selected six apparently healthy men and each counted the lobes of 100 neutrophile cells from each subject, taking the mean of the two figures so obtained. The normal count came out between 240 and 260 (Arneth's was 276). They then made daily counts, omitting Sundays, on five cases of benign tertian and one of subtertian malaria, all with parasites in the blood, and four cases of amoebic dysentery, and show the results in a series of charts. In all the malarial cases the initial count was low and the final count higher, in three within the normal limits (9 to 19 counts); the change tallied with the administration of quinine, that is, there was an initial shift to the left. In the amoebic dysentery cases there was no appreciable deviation from the normal at the outset and consequently in the later counts no appreciable change.

A. G. B.

REIS (Ascanio Paiva). **O indice normal de Arneth em S. Paulo.**—*Brazil Medico.* 1921. Sept. 24. Year 35. Vol. 2. No. 11. pp. 147–149.

The author's blood examinations, with a view to determining the normal index of Arneth in S. Paulo, were made on 50 apparently healthy persons of both sexes. Grouping the leucocytes into five classes, according to the number of their nuclear segments, group V comprising those with five "nuclei" or more, the following percentage formula was arrived at on averaging the 50 results:—

I	II	III	IV	V
5	26	44	21	4

Adding together classes I and II and half of class III the index figure 53 is obtained.

F. S. Arnold.

DRY (F. W.). **Trypanosomiasis in the Absence of Tsetses, and a Human Disease possibly carried by** *Simulium* **in Kenya Colony.**—*Bull. Entom. Res.* 1921. Nov. Vol. 12. Pt. 3. pp. 233–238. With 2 plates.

The human disease which is the subject of the second part of this paper is of a vague description, as regards history as well as symptoms. The author saw 23 cases. The chief symptom is that "the skin is in folds," appearing first on the small of the back, and occasionally extending to other parts of the trunk and in elderly people to the arms and legs. There are sometimes "spots" and always pruritus. Some seemed to be in a feeble condition. Some claimed to have been sufferers for 30 years. The Lumbwa are convinced that the affection is caused by the bites of Simulium, called by them "kekonjek," but only after prolonged subjection to their attacks. Cases are said not to occur except in the vicinity of forest infested by the fly, but a Kisii "elder" who had both folds and spots had never lived in infested country. Whereas eight adults living in a clearing in infested forest all had the disease, a number of children who had never left the spot were free. Blood slides obtained from three Lumbwa men, who were old sufferers, showed about 20 per cent. eosinophilia.

These are all the essential data. The photograph of the back of a native shows what might be scars or crusts on the lumbo-sacral region and buttocks, and the skin there thrown into transverse folds across the spinous processes. The incriminated fly is *Simulium neavei*, Roubaud. It inhabits dense well-watered thorn forest at about 6,000 feet, and to a less extent thin forest. It bites very readily and often raises half-inch wheals.

A. G. B.

THOMSON (Joseph Oscar). **Urinary Calculus at the Canton Hospital, Canton, China, based upon Three Thousand Five Hundred Operations.**—*Nat. Med. Jl. China.* 1921. Sept. Vol. 7. No. 3. pp. 136–158. With 3 text figs.

As the title indicates, this paper contains a wealth of information, chiefly statistical. Lithotomy was done for the first time in Canton in the year 1844, and in the last nine years of these statistics the annual average of urinary calculi was 62 cases. The etiology is discussed but no certain conclusions are reached. Surgeons in the tropics to whose lot it falls to operate for stone should study Dr. Thomson's paper.

A. G. B.

HENRY. **Traitement du pian-bois et du granulome vénérien par le tartre stibie.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 79–82.

The author at Cayenne, French Guiana, has treated eight cases of forest-yaws and four of granuloma venereum with tartar emetic. Details of one of each class of case are given; all were cured. He employs a 1 per cent. solution in physiological saline candle-filtered. 10 cc. are given intravenously every day till recovery is complete, that is, for 15–25 days. A local application of the same solution was attempted but caused insupportable pain. If the forest-yaw is large, it is first excised.

A. G. B.

NICOLAS (J.) & FAVRE (M.). **Traitement radiothérapique de la lymphogranulomatose inguinale subaiguë.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 472–473.

This lymphogranulomatosis, beginning with a small herpetiform ulceration of the genitalia, gradually involves all the inguinal glands until the groin becomes an indurated mass of fistulous suppuration. Radiotherapy has been found efficacious, particularly when the skin is still unbroken, but when fistulae have formed it has to be supplemented by surgery.

A. A.

COX (H. V. W.). **A Unique Instance of Lead Intoxication.**—*Indian Med. Gaz.* 1921. July. Vol. 56. No. 7. pp. 257–258.

It is a custom among long-term convicts in Indian jails to fashion a pouch in the upper part of the oesophagus by means of a leaden disk slung from the teeth and kept hanging in the gullet. How long the pouch (which is meant for hiding coins and other prohibited articles) takes to form is not known.

In the present case a prisoner suffered severely from chronic dyspepsia, constipation, and various muscle-pains, aches and nervous troubles, which baffled diagnosis until he confessed to having swallowed a leaden disk about 18 months before. Before he could be X-rayed he died. At the post-mortem an oxidized and superficially eroded disk was found in the stomach. In the array of symptoms paralysis and colic were not present.

A. A.

REVIEWS AND NOTICES.

MACPHERSON (W. G.), HERRINGHAM (W. P.), ELLIOTT (T. R.) & BALFOUR (A.). [Edited by.] **History of the Great War Based on Official Documents. Medical Services. Diseases of the War. Vol. 1.** pp. viii + 550. With 6 plates & various text figs. & charts. 1922. London: H.M. Stationery Office. [Price £1 1*s*. net.]

It is not consistent with the principles of this *Bulletin* to notice a volume of this class in its entirety, so that if we concentrate our attention on the chapters that relate to what we must continue to call—while the inhabitants of tropical countries remain so careless of the preservation of life, and so long also as we are at pains to define our terms— "tropical disease," we trust to be absolved from any want of appreciation of a work of enormous historic interest and of very high scientific and literary merit.

At the outset, however, it is legitimate to take thought upon some great lessons, to be found in the introductory chapter on "General Aspects of Disease during the War," which indeed are lessons for the whole profession and might be underlined in *any* medical journal.

The first of these lessons, based on local statistics exactly recorded, is "the immense effect of uncleanliness in the production of disease"; from these statistics we learn that the result may be "a sick rate from dirt diseases which amounts to nearly 50 per cent. of the total sickness of an army."

The second lesson, the texts of which are supplied by gas-gangrene, gas-poisoning, trench fever, etc., is the great usefulness of original research even when conducted under difficulties in the field.

The third lesson—as apt in peace as in war, and particularly apposite in tropical territories—is that the voice of the medical authority at the inner council-table is one of the essential factors of a successful State project.

The fourth lesson, taught like the last by the medical services in the war, is that the fullest knowledge of everything that tends to prevent disease is consistent with the highest skill and humanity in the treatment of patients.

Two other lessons may suggest themselves to the readers of some of the most important chapters of the book: the one is the ever-present moral of the insect, the other is that it almost needs a war to drive home the utilitarian value of pure biology and pathology.

The diseases included in this volume are enteric fevers, dysentery, cholera, typhus fever, cerebrospinal fever, influenza, bronchitis and broncho-pneumonia, malaria, blackwater fever, trypanosomiasis, relapsing fevers, phlebotomus fever, trench fever, jaundice, scurvy, beriberi, famine dropsy, pellagra, nephritis, and cardio-vascular disorders. All the articles are fashioned on a uniform plan; in the case of each disease the author, or authors, start with a general historic survey of its incidence and effects in armies, and then follow on with all the considered experience of the Great War upon its etiology, morbid anatomy, symptoms and complications, prognosis, both for the individual and from the army standpoint, diagnosis, treatment and prevention. So that the work promises to be not only part of the history of the war but also a lasting part of the history of medicine, not only a textbook for the army medical officer but also a book of great assistance to the civilian.

Limiting our attention to the chapters on diseases that specially beset the tropics, we may take, to begin with, the admirable chapter on dysentery, of the two chief forms of which there occurred during three years, 1916–18, on all six fronts collectively, over 84,000 cases. The copious experience of the medical officers of the army must therefore be interesting.

Bacillary Dysentery, besides its part in the tragedy of Gallipoli, was present on all the fronts, and in East Africa, in 1917, accounted for 486·5 of all admissions per thousand of strength. For exquisite diagnosis a fresh stool—best of all a swab from the rectum obtained by the pathologist himself—is necessary, but for practical purposes a sufficiently accurate judgment can be made on a microscopic examination of the cell exudate —an exudate of 90 per cent. undamaged polymorphonuclears.

The routine treatment recommended in the acute stage is castor oil and opium, followed next day and afterwards by sodium sulphate until the stools become feculent; with cocaine suppositories for tenesmus and dysuria. The value of antidysenteric serum is discussed; its chief weakness is deficiency in anti-Shiga immune bodies: the general opinion of it was favourable, but that it predisposes to arthritis; the author doubts that it is of any value if the mucous membrane has become necrosed. The fallacy of the necessary milk-diet is exposed: it is unpalatable, monotonous, and clots of undigested casein are passed; tea, albumin water, Brand's Essence, etc., are preferable.

In chronic cases rectal lavage with ½ to 1 per cent. protargol or freshly prepared eusol is mentioned with respect. Vaccine treatment has been disappointing. Appendicostomy has not been generally satisfactory; caecostomy with an artificial anus in the right iliac fossa and the adjunct of a Paul's tube is the operation that provides for the large bowel the requisite rest.

In the complications and sequelae of bacillary dysentery the author speaks of tachycardia and collapse; arthritis—usually in Shiga infections —which occurred in 27 per cent. of a series of Egyptian cases; general oedema, in some Shiga infections; conjunctivitis, and even irido-cyclitis; parotitis; neuritis of legs, in some chronic cases; and intussusception of the large intestine.

In prevention of bacillary dysentery the danger of human carriers, even in hospital, is emphasized; after convalescence it is quite common for bacilli to be excreted for months. As regards the fly carrier, the author isolated the Shiga bacillus from flies in the solitudes of the Sinai desert. This bacillus cannot stand sun, but it can live in water, if not exposed to sun or putrefactive bacteria, for at least three weeks.

Amoebic Dysentery occurred at all seasons of the year and constituted about seven per cent. of all dysenteries in the Eastern theatres of war, being highest in Mesopotamia. Its well-known latency and chronic persistence were observed. The improvements in treatment discovered during the war, and the fine revolution worked in theories of amoeba-cyst incidence and distribution, are too well known to need repetition.

The two chapters on Malaria are of an extraordinary interest from many points of view.

Malaria in Macedonia, where in the three years 1916–18 the total admissions amounted to 160,000, has already been fully noticed in this *Bulletin*; so that it is sufficient to refer to a few points on its incidence elsewhere, and to the further experiences of clinicians and pathologists.

" A good illustration of what may happen when exposure [to malaria infection] takes place without any protection " was supplied by an incident in the Army of the Black Sea. Three hundred and five N.C.O's. and men of the Warwicks were encamped on the banks of a small stream at Varda, without mosquito-nets, etc., without quinine. In a fortnight's time cases of malaria occurred, so the whole detachment was removed to a healthy hill site near Tiflis, where subsequently all the rest of the men except two went down with the disease.

In Palestine and Egypt the number of admissions for malaria was about 35,000; the prevalent Anopheles carriers were *A. pharoensis* and *turkhudi* in Egypt, and *A. bifurcatus, maculipennis* and *superpictus* in Palestine.

In East Africa the admissions, 1916–17, numbered about 107,000, being 57·4 per cent. of total admissions for sickness. *A. costalis* and *funestus* were the chief carriers.

In Mesopotamia the admissions for 1917–19 were about 20,000, the most dangerous species of mosquito being *A. stephensi*. The British soldier was observed to be more susceptible than his Indian comrade.

The pathology of malaria deserves full consideration in this *Bulletin.* Of a number of fatal cases of subtertian, 57 per cent. died within two days of admission. In 50 post-mortem investigations the causes of death were 10 from heart failure, 10 from cerebral complications, 7 from haemolytic jaundice, 3 from hyperpyrexia, 13 from pulmonary complications, and 7 from concurrent disease, particularly dysentery. Among pathological changes are mentioned fine fatty degeneration of the heart muscle akin to that of diphtheritic toxaemia; loss of characteristic lipoids, thrombosis, and necrosis of the adrenal glands; spleen commonly engorged and diffluent, showing necroses of pulp and Malpighian corpuscles, occasionally only firm and slightly enlarged (spontaneous rupture of spleen has occurred); liver and kidneys with foci of necrosis and deposit of pigment in large clumps; intestine in algid cases generally congested, with petechial haemorrhages and scattered necroses of the mucosa; brain with extensive blockage of capillaries by parasites, thrombosis, and degeneration of nerve cells, but sometimes merely oedematous.

A strange assortment of symptoms and sequelae in subtertian cases is recorded: several instances of men being arrested as drunk or mentally deranged; among other cerebral phenomena hemiplegia, epileptiform convulsions, symptoms suggesting cerebrospinal meningitis, sunstroke—men on the march falling out and dying; vasomotor disturbances resulting in gangrene of feet; joint effusions resembling acute rheumatism, pains in the bones suggestive of chronic rheumatism or influenza; haemorrhages into the skin resembling purpura, typhus, and even measles; haemolytic jaundice with profuse bilious vomit as of yellow fever, or spirochaetous jaundice; cases resembling acute nephritis; general oedema and ascites without albuminuria; haematemesis, vomiting as of intestinal obstruction, dysenteriform and enteric symptoms; profuse vomiting and diarrhoea suggesting cholera, in algid cases; bronchial and pulmonary signs and symptoms which by some authorities were regarded as purely malarial. Some of these symptoms or complications—dysenteric, enteric, bronchopneumonic and pneumonic—were sometimes also recorded in cases of benign tertian. The moral, duly emphasized, is that in a malarious country, though we should not mutter the ominous word "malaria" on every occasion, the patient's blood should always be carefully examined.

Though in the treatment of malaria, as in the account of symptoms and morbid anatomy, there may be nothing that is entirely new, yet the sublimated and condensed account of the careful clinics of hundreds of of thousands of cases in so many different countries has an inestimable value.

From all charges and controversies quinine emerges without a stain upon its own reputation, but we have learnt that it will not prevent relapses, particularly of benign tertian, and the old lesson has been repeated that it can do nothing in any circumstances if it is not absorbed.

In ordinary cases the routine treatment is a purge of calomel or blue pill, then a saline, then—if there are no gastric or intestinal difficulties—quinine *per os,* continued for at least three weeks, with the patient in bed for the first week. The salt preferred as the most soluble is the bihydrochloride. The dosage should be not less than 30 or more than 45 gr. per diem. During the second week quinine is more tolerable in an effervescing medium. After-treatment should extend to three months, and should include 10 gr. of daily quinine (given if necessary with HBr.), arsenic, and iron. In the management of the case the physician should be guided by frequent blood examinations.

When, owing to the gravity of the infection or the condition of the patient, quinine could not be given by mouth, intramuscular injections undoubtedly saved many lives and improved the chances of permanent cure. Owing to the destructive effect of quinine on muscle, this method should always be strictly aseptic and should not be employed in debilitated cases. The most generally approved treatment was 2 injections daily, for three days, of 6 gr. bihydrochloride in 1 cc. of distilled water, supplemented, if becoming possible, by quinine *per os.* Complete disappearance of parasites from the blood and internal organs subsequent to administration of injections amounting to 36 gr. was observed at an autopsy.

The intravenous method is reserved for cerebral cases with coma or convulsions impending, 10 gr. of bihydrochloride in 10 cc. normal saline being the dose. As much as 60 gr. in 24 hours have been given by this method, but as a rule it is better to supplement the intravenous with the intramuscular method.

Rectal injection was not much approved. The subcutaneous method was practised by the French and also by us in East Africa: there is still the risk of sloughing, and otherwise it has no advantages over the intramuscular route.

Many other preparations of quinine were used, and also arsenical preparations. The latter undoubtedly destroy parasites and also are of use in the necessities of malarial anaemia and cachexia.

In certain cases of incurable malarial cachexia splenectomy was tried and was said by enthusiasts to lead to improvement: it certainly did not prevent relapses. Transfusion of blood was followed by some striking immediate improvement, being followed by leucocytosis and regeneration of red blood cells; so far as experience goes it ought to be repeated once or more, at fortnightly intervals.

Quinine poisoning was observed, but not after ordinary therapeutic doses. Twelve cases of permanent blindness were reported from Salonica, generally as a result of heroic doses; in one case after 135 gr. given in three days. There is, however, no evidence that a moderate anti-relapse treatment of 30–45 gr. a day causes blindness. Temporary blindness usually begins to pass off within 24 hours of stopping treatment, but some restriction of the field of vision probably persists in most cases. No evidence of permanent deafness was made known. Individual idiosyncrasy to quite small doses of quinine was observed. Other quinine phenomena noticed were rashes, ranging in intensity from erythema to purpura, and in two cases exfoliative dermatitis. Transient haemoglobinuria without pyrexia, followed by rapid anaemia, also occurred.

Some hundreds of cases of Blackwater occurred among white troops, but not among black, and also among Chinese coolies in East Africa; and 136 in Salonica, where the mortality was 26·5 per cent. Of the Salonika cases 116 were recorded during the months December to April, the maximum incidence being in February.

Some highly interesting facts and illustrations must be culled from the chapters on scurvy, beriberi, famine dropsy, and pellagra.

Scurvy occurred in a small way in several places, but to a serious extent only among Indian troops in the earlier days in Mesopotamia, where the admissions went up altogether to 14,479. It also occurred among some German prisoners of war in England, who, though receiving an adequate provision of vitamin, destroyed it by prolonged stewing. The discovery that lime-juice long kept has no antiscorbutic value, and even when fresh is much inferior to lemon-juice—and has in fact been allowed to misappropriate the reputation of lemon-juice, and the application of **FÜRST**'s discovery of the antiscorbutic value of sprouting lentils (if but lightly cooked) are outcomes of the war.

Though Beriberi was limited in amount and felt chiefly in labour-corps of Orientals, 564 cases occurred in white troops in Mesopotamia, at a time when, by the misfortune of war, the rations consisted mainly of tinned beef and second-rate biscuits. This it was that lead to the confirmation of the prophylactic value of extract of yeast (marmite). The Indian troops in the same circumstances were untouched, thanks to their ration of *atta* (coarse flour) and *dhall* (pulse), substances rich in anti-beriberi vitamin.

In the British army, Famine Dropsy (a combination of oedema, polyuria, bradycardia and asthenia) was, it is needless to say, unknown—except in unhappy soldiers who had come out of certain German prisons. The scholarly article on this disease is—if one may forget the melancholy associations—one of the gems of the book.

Pellagra also was not much a matter for British troops ; but on followers and Turkish prisoners in Egypt it fell with sufficient force to evoke a most finished and illuminative investigation, which shows that no explanation of causation fits the facts, and receives support from all the circumstances, so well as the theory of "lack of sufficient biological value of protein."

The chapters on Typhus and on Trench Fever we have to leave, but with reluctance, as they illustrate so many things both material and spiritual, both squalid and heroic. Our exact knowledge of the one is considerably, of the other entirely, a part of the salvage of the catastrophe of the war.

The very fine chapter on the Enteric Fevers not only brings out the remarkable results of protective inoculation and the wonderful efficiency of the sanitary services—for in upwards of four years, in six theatres of war, and in an average mean strength given here as upwards of two millions, the sum of cases of enteric fevers was only 20,149 with a mortality of 1,191—but also exhibits the influence of the war in correcting and adjusting the views of the medical profession on this important subject. Though little has been done to modify treatment (for the value of vaccine is still *sub judice*), the experience of the war has established the fact that there is no essential difference in the morbid anatomy of typhoid and the paratyphoids, though in the paratyphoids the lesions are less intense, the complications are neither so frequent nor so serious, and the mortality is less by more than one-fourth. Equally in both when infection overtook men who had been inoculated the fever was lessened in severity and duration, so that an average typhoid case might be difficult to discriminate from a paratyphoid, and in an average paratyphoid case clinical evidence of enteric fever might even be wanting.

As already explained, we have taken but a particular survey of this remarkable official publication, but we hope to have conveyed some idea of its immense interest to the medical profession in the Tropics.

A. Alcock.

Roger (G. H.), Widal (Fernand) & Teissier (P. J.). **Nouveau Traité de Médecine. Fascicule V. Maladies infectieuses et parasitaires (fin). Cancer.**—748 pp. With 35 figs. & 4 plates. Masson & Cie., Editeurs, 120, Boulevard Saint-Germain, Paris. 1922. [Price 50 fr. net.]

This volume forms part—albeit a very important one—of an ambitious work planned to embrace the whole range of medicine in 22 volumes of approximately equal dimensions. It is written in a straightforward, intelligible and easily assimilable style, admirably suited for students, and particularly well adapted for those readers who are not intimately versed with the intricacies of the French idiom. We note, as an innovation, the practice of recording the name of each contributor, or set of contributors, at the right hand bottom corner of a set of pages for which he or they are responsible.

The first part of the present volume, 339 pages, is a completion of infectious and parasitic diseases which have occupied the first four volumes of the series.

The first chapters, some 28 pages and 5 figures, are devoted to a consideration of soft venereal sore and ulcerating granuloma, by R. Demanche. In the latter case considerable support is given to the claim of Souza-Araujo as to the specific nature of the *Calymmato-bacterium granulomatis* and to the efficacy of tartar emetic in this loathsome disease. The account of goundou by Ch. Joyeux does not differ in any important particular from that in the other similar text books ; and the same may be said of Yaws (Pian et Bouba) by the same authority.

The section on relapsing fevers by such authorities as Ch. Nicolle and L. Blaizot is a particularly pleasing production. Dealing with these fevers in general we may note that "tick fever" is described under a separate heading and that the subject is handled in a manner which differs materially from that adopted in English text books on this disease; no attempt is made to differentiate minor clinical variations of the disease and to correlate them with geographical races or subspecies of the *Spirochaeta obermeieri*. Rat-bite fever, under its Japanese designation, "Sodoku" (*so*=rat, *doku*=poison), by D. THIBAUT, is an up-to-date account of the subject with temperature charts and illustrations. It is founded mainly upon the researches of FUTAKI, TAKAKI, TANIGUCHI and OSUMI, published in the *Journal of Experimental Medicine*.

Malaria, occupying 106 pages, with 9 text figures and 2 coloured plates, is contributed by H. VINCENT and J. RIEUX. The historical aspect of the subject is fully treated and is one around which very considerable contemporary interest centres. Full recognition is given to the work of LAVERAN in 1880 and little can now be added to his account written at that time:—"*La relation qui existe entre la présence dans le sang des nouveaux parasites que j'ai décrits et les accidents de l'impaludisme me paraît indiscutable.*" To LAVERAN is given the credit of suggesting, in 1891, that mosquitoes could play a part in the transmission of malaria. It seems to us a very grave omission that the part, and to most minds a leading part, played by Patrick MANSON, throughout the whole of this memorable epoch, should have been passed by without recognition; indeed, we have searched for his name in vain.

Blackwater fever, by the same authorities, is treated in a separate chapter; they agree with FIRKET in regarding it as an "accident parapaludéen," and give very considerable, and, to our minds, unjustifiable prominence to the quinine theory of its causation. Few modern authorities, basing their opinions on war experience, would be ready to bear out the figures of CARDAMATIS upon the deleterious action of quinine in the treatment of this disease.

Kala azar, by Ch. NICOLLE, is very briefly treated within the space of five pages. The typical temperature chart has been omitted and treatment is dismissed in eight lines. The subjects of oriental sore and espundia are equally briefly described in three pages. One is impressed with the disproportionate handling of the subject matter, for, on turning to trichinosis, by Ch. JOYEUX, a disease which, however important as a classical example of parasitology, is one of but little contemporary interest, we find a very full account spread over 17 pages, where treatment of an infection for which no specific remedy has, as yet, been forthcoming is handled at length.

The chapter on filariasis by J. GUIART is particularly disappointing. The account is to a great extent a translation of the classical description in Manson's Tropical Diseases. But little prominence is given to the geographical peculiarities of filariasis or to the interesting speculations aroused by the discovery of the non-periodic variety, of *F. bancrofti*.

Strongylosis, distomatosis, coccidiosis and the quite exceptional sarcosporidiosis are also described by GUIART. We may note the prominence attributed to human infections with *F. hepatica*. GUIART maintains that this is a far commoner parasite of man than has hitherto been thought to be the case. In the account of coccidiosis, nothing new has been added to the well-known work of DOBELL.

The subjects of echinococcosis, hydatids and cysticercosis are all treated by F. DÉVÉ. They appear to be adequate and accurate.

Prof. E. BRUMPT handles human trypanosomiasis in an eminently full and creditable fashion, and we may note, on page 297, the first published text-book account of the new remedy, "Bayer 205." It is recorded that this drug is innocuous, as much as 8·2 gm. have been injected intravenously, without visible detriment, within a space of 16 days.

The account of Chagas' disease is based, to a great extent, upon the author's own studies. It is by far the most complete and authoritative text-book account we have yet seen. He evidently gives little credence to the association of gross abnormalities of the thyroid gland with the presence of *T. cruzi* in the blood, and we are provided with his views upon the evolution of the leishmania-like bodies from the true trypanosome forms.

Bilharziasis, again by Brumpt, fulfils expectations: but it may be remarked that some of the illustrations require amendment—for instance, fig. 1 on page 315, the time-honoured figure of *S. haematobium* after Looss, obviously represents *S. mansoni* according to modern conceptions.

The second portion of the volume, comprising 408 pages, consists of a treatise on cancer by Gustave Roussy and Maurice Wolf. The numerous illustrations are excellent and the whole account is a most creditable study of the biology, anatomy, symptomatology, experimental reproduction and therapeutics of carcinoma. It is probably in its way a unique work, for certainly within recent years no account has appeared in French or any other language which treats of this subject in such a thorough and comprehensive manner; for this achievement the authors are to be congratulated.

We again emphasise that common omission, so often voiced on French standard works, namely, the absence of a general index; an omission which robs this excellent volume of much of its usefulness.

Regarding the illustrations as a whole, they can be assessed as good in accentuating the main points, but the photographic reproduction is poor. Too much use has been made of the now familiar text-book illustrations. Plates 1 and 2 of the malaria parasites are accurate in the main, though the actual coloration appears too gaudy.

Philip Manson-Bahr.

Van Thiel (Pieter Hendrik). **Anopheles en malaria in Leiden en naaste omgeving.** [Anopheles and Malaria in Leiden and Near Surroundings.]—98 pp. 1922. Leiden: Eduard Ijdo.

In this well-written thesis van Thiel gives the results of his careful and elaborate researches on malaria-carrying mosquitoes, and the epidemiology of malaria; and also deals with the historical aspects of the subject in Leyden.

The following explanations may be given of the cases of malaria which occur in the early part of the year.

(*a*) Infection may take place in the autumn and the attack of malaria may not develop until after a prolonged incubation period of 6–11 months. Experience during the great war has proved that this certainly may happen.

(*b*) Infection may be transmitted by hibernating mosquitoes which leave their hiding places in the first warm days of spring and suck blood from people with latent malaria. Although theoretically a sound hypothesis, the practical objections against it are that such latent cases of malaria do not have sufficient numbers of gametocytes in their blood to cause infection, and secondly that only seldom in winter and spring are blood-filled mosquitoes found.

(*c*) A third possibility is an infection in the spring by mosquitoes infected in the previous autumn. Up to quite recently, no one had been able to demonstrate normal sporozoites in the salivary glands of mosquitoes during the winter, but Swellengrebel detected them, in January and February, 1921, in mosquitoes in Amsterdam, and quite a new aspect of this question of "overwintering" of the sporozoites is given by the researches of Wenyon, Mühlens and Mayer. These researches have raised the question of the sporozoites surviving during the winter in other parts of the mosquito than the salivary glands. In the Anopheles caught in and near Leyden the author has never been able to find sporozoites in the salivary glands during winter. He has, however, noted the presence of the pseudo-sporozoites first described by Grassi (1901).

As important epidemiological factors with regard to the marked decrease of malaria during the last century in civilized countries, the author mentions the improved hygienic conditions, the cultivation of land, whereby the breeding places of Anopheles are destroyed, and the improved cattle sheds.

T. Joekes.

CARAZZI (Davide). **Parassitologia Animale.**—II Ed. 8vo. pp. xii + 467. With 4 plates (3 coloured) and 235 figures in text. Milano (Società Editrice Libraria), 1922. [Price L.75.]

This attractive volume is, as we learn from the title-page and prefaces, the second edition, "corrected and enlarged," of a work which appeared originally in 1913. Its scope is sufficiently explained by a somewhat lengthy sub-title indicating that it deals with "animal parasites of man, and animals which transmit parasitic diseases to man and domestic animals, with technical directions for the collection, preparation, and macroscopic and microscopic study of parasites." Its distinguished author has for some years occupied the Chair of Comparative Anatomy in the Royal University of Florence, and those who know anything of his other writings will expect to find the subject handled with skill and insight of no ordinary kind: they will expect to find originality and precision combined with common sense and uncommon critical ability. And in none of these things will they be disappointed. Moreover, the author possesses a limpid style and a mastery of his own language which is impressive even to a foreigner. He is often dogmatic and caustic in his criticisms, and even occasionally—one may be allowed to think—quite wrong; but he is never dull—not even when he writes of colloids, nomenclature, anti-malarial measures, and other matters which afford ample opportunities for the tedious and long-winded compiler.

The work is divided into three main parts, dealing respectively with the Protozoa, the Worms, and the Arthropods. Each section is subdivided into a number of chapters, in which the organisms are described in systematic order, and anything of particular parasitological or general importance connected with them discussed at length. It is self-evident that no man can claim, at the present day, to be authoritatively expert in the three sciences of Protozoology, Helminthology, and Entomology, each of which is more than enough to require the undivided attention of a lifetime. It was possible, perhaps, in the days when LEUCKART attempted to learn all that could be learnt about the animal parasites of man; but even he did not succeed in mastering the whole subject. Still less did BRAUN, who came after him, ploughing the same furrows afresh. Consequently, the man who now undertakes to work over the whole field is bound to go astray here and there. The specialist, in each subject treated, will find him now and then out of date, misinformed, and errant in judgement. But this is inevitable, and does not outweigh the manifest utility of a book of this comprehensive scope. Furthermore, it is clear that if considerations of this sort apply to the author, they apply no less to the reviewer of such a book. It is easy for him to pick out and criticize what he regards as errors in the treatment of his own special subject; but it would be absurd for him to think that, when he had done so, he had really made any useful criticism of the work as a whole. It thus seems to the present reviewer that the best thing he can do is to indicate the contents of the work before him, instead of attempting to criticize those details of it with which he is more or less competent to deal.

In a brief "Introduction" the author lucidly writes of "animal parasitology and its importance in modern medicine"; of "parasitic animals and plants and the divers sorts of parasitism"; "of zoological classification and the concept of species"; and of "the main subdivisions of the animal kingdom." Chapter I then deals with "the cell" and "protoplasm" in a general manner (though not wholly along conventional lines), and prepares the way for Chapter II on "the morphology and physiology of the Protozoa." The next four chapters describe, in order, the Flagellates Rhizopods, Coccidia, and Haemosporidia. Of special interest to *icteroides* and *L. icterohaemorrhagiae*, which has already been reviewed in this *Bulletin*, Vol. 19, p. 565, and one on the Mortality Statistics of Yellow Fever in Cuba in the latter half of the 19th century. A brief résumé is given of a third paper on Yellow Fever, in which it is stated that in the discussion which followed Drs. GUITERAS, AGRAMONTE and LEBRÈDO " expressed the opinion that the facts as known at present are against the acceptance of the *L. icteroides* of Noguchi as the causal agent of yellow fever."

As regards the mortality statistics of yellow fever these are in part hypothetical, since accurate records have not been kept during the whole period dealt with. The estimated total is given as 110,418. During the period 1854 to 1879 there were 29,003 deaths among the civil population, and between 1854 and 1897 among the Spanish soldiers, 37,698 died. In Havana alone there were 36,575 deaths in the 50 years from 1853 to 1902.

Yet one other contribution, a paper by Dr. PIÑERO read in the Medico-legal section, is of interest to district medical officers and others practising in the tropics who may at any time be called upon to give evidence in a court of law, when a body has been found in the water, as to whether the person had died from drowning or not. A new test is described which is quite simple to carry out. The apparatus employed consists of a U-tube, 52 cm. in length and 13 mm. in internal diameter, mounted on a wooden stand. The limbs are graduated in centimetres. A mixture of benzol and chloroform of specific gravity 1,050, or about that of the blood, is poured into the level of the top of the graduations. With a thoroughly dry pipette blood is taken from the right side of the heart and a drop allowed to fall into the fluid in the right limb of the apparatus, care being taken that it does not touch the sides. With a second pipette a drop from the left side of the heart is similarly allowed to fall into the left limb.

Dogs were used for experimental tests. If killed by immersion in fresh water the blood from the left side of the heart was found to be of less density than that from the right, and the difference of level in the two limbs was from 1 to 1·5 cm. If drowned in salt water the blood from the left side was found to be of greater density than that from the right, the difference being almost constant, 1·5 cm.

Other dogs were killed by puncture of the bulb and then submerged for 10 hours, some in fresh, some in salt, water. The drops from the different sides of the heart remained at the same level, for the difference was very slight (3 mm.). The author claims that by this simple means a definite answer can be given to the question : " Did the person found in the water die from drowning, or was the body thrown into the water after death ? "

H. Harold Scott.

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SOME FEVERS OF SHORT DURATION: A REVIEW.

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INTRODUCTION.

Ever since the early period of the war there has been much published on these fevers of short duration, fevers variously described as one-day, three-day, five-day, six-day, seven-day and fourteen-day fevers. It cannot be too emphatically stated that these time designations in the nomenclature of disease are generally unscientific and often misleading; only second in unreliability to geographical names, such as Malta fever and Oriental sore—the former a world-wide disease, the latter found in America. Generally speaking, what is meant by one-day fever is a mild febricula due to climatic exposure or to some intestinal disturbance. Three-day fever is usually another term for sand-fly or Phlebotomus fever. Five-day fever was applied to trench fever. Six- and seven-day fever most often mean dengue or some of its very close varieties having modified symptoms dependent upon local conditions. The multiplication of terms leads to confusion, which, often repeated, obstructs progress and measures of prevention.

A real advance has, however, been made in the past ten years in tracking down the etiological factors, and in the study of the bionomics of the "carriers," but of the viruses we are still to a great extent ignorant whether they are filterable agents or of spirochaetal origin, though the Japanese have proved one form of seven-day fever to be due to the *Leptospira hebdomadalis,* which organism has been found in the blood and is passed out in the urine, and in Japan is thought to be carried by a species of field-mouse. This disease has many points of resemblance with dengue and the endemic fever found in the coastal towns of India, Ceylon, Africa, the Mediterranean, and America. It appears probable that all these dengue-like fevers are due to spirochaetal organisms which at some stage of their evolution are filter passers, and that a mosquito, generally a species of Stegomyia, acts as the carrier. Their distribution is practically circumtropical or subtropical, and it seems unnecessary to describe each geographical group under a different name.

PAPPATACI, PHLEBOTOMUS OR THREE-DAY FEVER.

This disease was first definitely described by DOERR from cases in the Adriatic region, and was recognized clinically by McCARRISON in Chitral (1903–4). In 1915 it was well described by BIRT from observations made in India and Malta. He states that out of 71,000 European troops in India there were in 1912 as many as 2,163 admissions for this fever, and many that were mistaken for malaria; since then, with knowledge of the cause, the numbers have been greatly reduced. GRAHAM (1915) states that the optimum temperature for the development of the Phlebotomus imago is 70° to 80° F. in the Chitral valley; MARETT at Malta found it to be 70° F. GABBI attributed the introduction of the fever into Sicily and Southern Italy to phlebotomus conveyed in wood cargoes from Dalmatia and Istria, and to earthquakes which provided in the ruined walls favourable breeding places. BOLT (1915) described cases of the fever and the prevalence of the flies in Northern China, the worst months being May and June. SERGENT (1914) gave a good account of its prevalence in Algeria. In 1916 SARRAILHÉ and ARMAND-DELILLE described a short fever among the troops in the Dardanelles in the presence of *P. papatasii*; this fever they unfortunately called "Mediterranean dengue." Other cases at Salonika, lasting five to six days, often showed a dengue-like eruption. ADRIEN also uses this name for a three-day fever in Syria, when both mosquitoes and sand-flies were abundant.

Throughout the war epidemics of three-day fever were described from many places in the Eastern Mediterranean among the naval and military forces when phlebotomus were always prevalent. In 1916 LEGENDRE found *P. papatasii* in the valley of the Somme, but no endemic cases, and in the same year LANGERON found females in the Seine valley, near Paris. HARNETT (1916) suggests that about 20 per cent. of sand-fly fever cases run a severe course and last five to six days, and he draws no distinction between the three-day fever and the six-day fever of India. LAMBERT, in an epidemic of 237 cases at Lemnos, states that the duration in 29 per cent. was four days, and three days in only 14 per cent., and that second attacks were uncommon, immunity being established in 90 per cent.; on the other hand, DELMEGE and STADDON, in Macedonia, state that reinfections were comparatively common. BRACK, in Turkey, found relapses uncommon, and he noticed that horses at this time suffered from a short fever of a similar nature.

JOUIN (1918), who made observations on the blood-pressure, found that the maximum was raised during the first 12 hours and then fell slightly; after 24 to 72 hours it again rose to normal; the minimum is generally low in the first 12 hours, and after 24 hours rises to normal; in all cases there is a marked bradycardia due to increased irritability of the vagus caused by the virus acting on the bulb centres.

The chief "carrier" of infection is the *P. papatasii*, but *P. minutus* var. *africanus*, *P. perniciosus*, and *P. major* var. *chinense*, Newstead, are probably also able to infect in different regions.

ROUBAUD states that *P. minutus* var. *africanus* has a wide distribution in Africa; he agrees with HOWLETT that it feeds on lizards and snakes; TOWNSEND also mentions that *P. verrucosus* of Peru feeds upon the blood of lizards. It is known that a blood feed is essential for fertilization of the eggs.

During the great influenza epidemic of 1918 the diagnosis from phlebotomus fever was often very difficult and the statistics were involved.

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DENGUE.

The chief interest of dengue depends upon its symptomatic relationship with yellow fever on the one hand, and, on the other, with the so-called six- and seven-day fevers described by ROGERS in India and DEEKS at Panama, on the mosquito-borne theory of transmission, and on the character of the virus which causes the disease. Since the work of ASHBURN and CRAIG, there has been abundant evidence that a mosquito is the carrier, but the kind may vary in different localities, possibly *Culex fatigans* in Asia Minor, and a Stegomyia, as definitely proved in Australia by CLELAND, BRADLEY and McDONALD and in the South Sea Islands. A Stegomyia was believed by LALOR to be the carrier of the seven-day fever in Rangoon, and this suggested an affinity with yellow fever. In the Anglo-Egyptian Sudan, ARCHIBALD (1917) also considered that *S. fasciata* was the carrier of the dengue-like fever there.

The disease is very widely distributed, epidemics occurring in the Mediterranean area, Asia Minor, North Africa, West Africa, Equatorial Africa, India, Philippines, China, Formosa, Mauritius, West Indies, Tropical America, Argentina and Uruguay, etc. Up to 1916 the disease had not been recognized in Argentina. KRAUS then reported an epidemic which attacked nearly the whole of the population and was diagnosed as dengue; both culex and stegomyia were very prevalent. The symptoms were fever, pain in head, eyes, muscles, and joints, with a polymorphic eruption followed by desquamation; the blood showed a leucopenia, the convalescent stage was worse than the febrile owing to the pains; there were no deaths. The epidemics of fever described by CLELAND, BRADLEY and McDONALD, with the above, link up in a remarkable way true dengue with the seven-day fever of ROGERS.

A very careful study of the disease in Formosa was made by KOIZUMI, YAMAGUCHI and TONOMURA. Clinically the disease was typical and there was only one death out of 6,000 cases; parasites were never found in the blood, but a leucopenia was constant. Injection of defibrinated blood from a dengue patient gave negative results with dogs, rabbits, white mice, and monkeys, but guinea-pigs died after 7–36 days and the blood infection was transferable to other guinea-pigs. CLELAND and BRADLEY were able to pass the disease by artificial inoculation through four generations, and they found that the virus was present in the blood from 18 to 90 hours after the onset of the fever. The transference of as small a quantity at 0·00005 mil. from man to man was found to be infective (Koizumi, Yamaguchi and Tonomura), and these workers were able to transmit the disease by stegomyia and not by culex, so that the rôle of the latter, if positive, must be very restricted.

Couvy, at Beyrouth, Syria, states that during a severe epidemic he has found delicate spirochetes in the blood immediately before the onset of the fever.

Goldsmid, in Australia, has mentioned purpuric complications; these are very rare and in his cases were possibly due to old malaria.

In 1920, Craig, who believes that the disease is due to a spirochaetal infection, suggested that investigations should be carried out similar to those of yellow fever; for we know that the virus is in the blood, that it is a filter passer, that the filtrate is infective, and that a stegomyia is commonly the carrier. A systematic use of the dark ground illuminator, and of Noguchi's culture media, as used for the Leptospira of yellow fever and spirochaetal jaundice, will probably lead to positive discoveries in dengue.

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JAPANESE RIVER FEVER OR TSUTSUGAMUSHI DISEASE.

This fever has been most frequently described from Japan and Formosa, but according to old Chinese literature it has been present in China for a very long time. It was originally mistaken for typhus and was first scientifically studied in 1879 by Bälz and Kawakami, who called it "flood fever." The facts are now established that the disease is attributable to the bite of a species of mite, *Leptus akamushi*, Brumpt, which is found mostly in the summer months in low-lying areas, abundantly infesting the ears of field-mice and other rodents. The mite is probably distributed also by a small field-warbler, *Acrocephalus orientale*, and other local birds.

The virus is present in the blood in an early stage of the disease and a minute quantity of blood, 0·001 mil., is infective. The infective agent, as discovered by Hayashi (1917), occurs as minute rods, spherical or ring-shaped bodies, in the lymph glands, endothelial cells of the spleen and lymph nodes, as well as in the blood, generally free but rarely in the red cells; the provisional name *Theileria tsutsugamushi* is suggested for it. There appears to be a vegetative and a generative cycle, with a great similarity to the bodies found by Wolbach in cases of Rocky Mountain fever.

Ogata (1917) stated the cause of the fever to be a filamentous fungus, which he obtained from the eruption and the blood and was able to grow on solid media, and that from the pure cultures he produced the disease experimentally in guinea-pigs and rabbits, just as readily as from tissue emulsions or the blood of infected cases. So far these statements have not been confirmed; the cultural experiments of HAYASHI were completely negative.

The disease has been transmitted experimentally to monkeys, guinea-pigs, rabbits, and calves.

A great deal has been written about the development and life-history of the mite, which has variously been described as *Trombidium*, *Leptotrombidium* and *Leptus akamushi*; much of this is very technical (NAGAYO, MIYAGAWA, MITAMURA and others).

The disease occurs endemically and is characterized by skin lesions, swollen lymphatic glands, and high fever. In Japan, during 1889–1909, there were 1,520 cases, with 420 deaths, or 27·9 per cent. The outbreak coincided with the appearance of the field mouse, driven by the floods from place to place carrying akamushi larvae with them. The incubation is from seven to ten days, and the rash appears from the fifth to the ninth day (KATISHIMA, MIYAJIMA).

Treatment.—The excision of the primary lesion is recommended, and some success has been obtained by the early use of immune serum of monkeys and cattle. For prevention it is important to destroy the mites on the infected soil, as well as to defend the body from the attacks of the parasite. Cresol soap solution, 100 per cent., was found effective. In a very infested district the soil was treated for 59 days, and the clothes of the labourers were well sprayed; among these, averaging 89 per day and treated for 44 days, not a single case of infection occurred (KAWAMURA, HATTORI and YAMAGUCHI, 1920).

In Formosa the disease is very widely spread and is not confined to the valleys; it is also present in Korea, and according to ASHBURN and CRAIG perhaps in the Philippines. A similar mite-borne disease was described from Deli, Sumatra, by SCHÜFFNER (1914) under the term of pseudo-typhus, a name rather extensively used for a disease of about 14 days' duration associated with a marked and rather typhus-like eruption, but having a low mortality, in all cases transmitted by a blood-sucking ectoparasite, not always determined.

In 1921 MEGAW summarized this group of typhus-like fevers.

TYPHUS GROUP.

Louse Typhus.	Tick Typhus.	Mite Typhus.
A louse-borne disease of filth, crowding, poverty :—	A disease of open-air life in the wilds :—	A disease of recently flooded places :—
A. Severe typhus (mortality high).	A. Rocky Mountain fever :— (1) Montana type (high mortality —60 per cent.). (2) Idaho type (low - mortality —18 per cent.).	A. Tsutsugamushi (high mortality—up to 55 per cent.).
B. Mild typhus or Brill's disease (mortality low).	B. (?) Tick typhus of Kumaon and other places in India (low mortality—about 5–10 per cent.).	B. Sumatra tick typhus (low mortality).
C. Tabardillo or Mexican typhus.		

To these must probably be added, the macular fever of Tunisia [CONOR and BRUCH], a fever in Korea [WEIR (1915)], one in the Federated Malay States [DOWDEN (1915)], one in Saigon [NOC and GAUTRON (1915)], and a form in Nigeria [DAVIES & JOHNSON (1921)].

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ROCKY MOUNTAIN SPOTTED FEVER.

Much progress has been made during the past ten years in determining the cause and means of prevention of this disease. In the excellent monograph by WOLBACH, of Harvard (1919), is contained all the known information, consisting very largely of his own work. The fever is found in Idaho, Montana, Wyoming, Utah, Nevada, Oregon, Colorado, Washington State, probably in Alaska; and KELLY has shown that it exists in California, where it has probably been endemic for a long time, and is of a rather less severe type than that of Montana but more than that of Idaho.

The virus is a form of Rickettsia body called by WOLBACH *Dermacentroxenus rickettsi*, a new form of organism, not an ordinary bacterium, but not having a complicated life-cycle as in protozoa. It is transmitted by a tick, *Dermacentor venustus*, the larval and nymph stages of which are passed chiefly on ground squirrels, wood-chucks, chipmunks, and many other rodents, which may act as reservoirs.

The areas of infection are sharply limited, but differ immensely in their mortality rate, for in Montana it may be as high as 90 per cent. whereas in Idaho it is only 5 per cent. April, May, and June are the most unhealthy months.

The disease has to be differentiated from typhus and enteric. The essential lesions are found in the vascular system; the infecting organisms are present in large numbers in the endothelial cells, which accumulate in the vessel walls, round the vessels, and in the lymphatics, particularly of the skin and genitalia; the haemorrhagic lesions of the genitalia are characteristic. FRICKS (1916) obtained from the blood of infected animals ten strains of anaerobic bacilli; these were not pathogenic to guinea-pigs, but if the cultures were inoculated from the twenty-first to the twenty-fifth day into other guinea-pigs they gave rise to the definite lesions of Rocky Mountain fever, showing that there was some multiplication of the virus in the cultures.

In the Montana type as described by MICHIE and PARSONS (1916) the symptoms are very severe, with sudden onset, continued fever, enlarged spleen, early albuminuria, slow pulse, pains in head, neck, back and joints, and peculiar eruption.

Most of the ticks which transmit spotted fever in Montana develop on animals grazing over the foothills during the spring months, when systematic dipping is found to be unsatisfactory, and the destruction of wild rodents is more practicable. It was believed that sheep might prove useful in clearing off the ticks, which become entangled in the wool and die; but an experiment made with 1,000 sheep in an area of 1,200 acres was not successful; enough ticks remained to keep up a normal supply [KING (1916)]. PARKER insists that protective measures successful in one part may not be applicable in another, and mentions as examples Eastern and Western Montana. In the former place the hosts of the ticks, both wild and domesticated, have unrestricted freedom and the infestation is naturally less than in areas such as the Bitter Root Valley in Western Montana, which is fenced.

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OROYA FEVER AND VERRUGA PERUVIANA.

STRONG, TYZZER and SELLARDS, in various papers and finally in an excellent monograph, published by the Harvard School of Tropical Medicine (1915), have described the results of their investigations of these conditions. Their conclusion is that Oroya fever and Verruga peruviana are two separate and etiologically different diseases, the former not being limited to the Oroya valley. In Oroya fever are found the intra-corpuscular bodies, "*Bartonella bacilliformis*," causative of the disease. These bodies multiply in the endothelial cells of the spleen and lymph glands; the little spheres which are present resolve into a large number of minute elements, each containing a chromatin granule; these elongate and finally appear as distinct rods having a granule of chromatin at one end. When the spheres rupture and the bodies are set free the rods are most apparent and are identical with the bodies seen in the red cells of the peripheral blood. The appearance of the infected endothelial cells is like that of the life-cycle of *Theileria parva*, as figured by GONDER, and suggests that the bodies are of a protozoal nature. Though verruga can easily be transmitted to animals, they were unable to transmit the parasite of Oroya fever either by subcutaneous, intravenous or intratesticular inoculations.

They were able to pass the virus of verruga, which, however, becomes attenuated, through 12 successive monkeys; it appears to be filterable, but its nature was not actually discovered. Inoculation of verruga material into a human volunteer produced none of the blood changes seen in Oroya fever, but gave rise to a local infection of verruga which was passed on to an animal. This and other experiments proved the duality of the diseases.

TOWNSEND, on the other hand, still maintains that Oroya fever and verruga are both transmitted by *Phlebotomus verrucarum*, found in the verruga zone, and are manifestations of one disease, but his etiological researches and his animal experiments are not convincing. It appears quite certain from the reports of GOMEZ (1913–15) that the infection of Oroya fever is spread by some night-biting insect, for it is the experience of all travellers in Peru that the disease is contracted if the night is spent in the locality, whereas passing through in the daytime is quite safe. Epidemics among gangs of labourers engaged on engineering works may be cut short by the use of mosquito curtains or by the removal of the men to sleeping quarters elsewhere at the end of the day.

TOWNSEND could find no evidence that either mosquitoes or ticks transmit the disease, the nocturnal vector of which, while abundant in the wet season, is never altogether absent, and he considers that *P. verrucarum* is the only form that meets all these requirements.

HERCELLES (1918), writing on the histo-pathology of the spleen in Oroya fever, states that the organ is greatly enlarged from the increase of lymphoid tissue; later there is extreme thrombosis producing infarcts and afterwards shrinking and puckering. He thinks that these changes may assist in producing the intense anaemia. According to STRONG and his co-workers these changes are due to a toxic substance produced by the specific parasite.

At present the balance of evidence favours the view that the two conditions so common in the same district are different entities, and that Oroya fever is conveyed by a night-biting insect, probably *P. verrucarum*. Further experiments are required on the transference of both diseases to animals and the production of immunity reactions.

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MEDICAL ZOOLOGY.

GUNN (Herbert). *Councilmania lafleuri* **not a New Amoeba.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 24–27.

The author has made a comparative study of eight cases of "Councilmania lafleuri" infection and specimens from *Entamoeba coli* infections, all the material in question being authenticated from Dr. KOFOID's laboratory, and he here gives a critical summary of the result. It is perhaps enough to say that he finds that the deeply-staining ridge and the budding, characteristic of "Councilmania," can be produced in cysts of *E. coli* by pressure on the cover-slip, and that he agrees with WENYON's verdict (this *Bulletin*, Vol. 19, pp. 19–22) relegating *Councilmania lafleuri* to the weary list of synonyms of *E. coli*.

A. Alcock.

LYNCH (Kenneth M.). **Cultivation of** *Trichomonas* **and the Question of Differentiation of the Flagellates.**—*Jl. Amer. Med. Assoc.* 1922. Sept. 30. Vol. 79. No. 14. pp. 1130–1133. With 13 figs.

The author gives historical and specific details of the cultivation of Trichomonas. He considers that all the circumstances of its existence at present known point to its being a harmless commensal in the human body. The specific conceptions must be clarified, and this would best be done by culture of different material in identical media.

A. A.

PARISOT (J.) & SIMONIN (P.). **Gangrène pulmonaire et** *Trichomonas.*—*C.R. Soc. Biol.* 1921. Dec. 10. Vol. 85. No. 36. pp. 1077–1079.

The authors refer to an observation by A. SCHMIDT (*Münch. Med. Woch.*, 1895, No. 51) of a Trichomonas, which he called *T. pulmonalis*, in a case of pulmonary gangrene, and give a further reference to VERDUN, *Précis de Parasitologie humaine*, 2nd ed., p. 156. They continue with an abstract of a case of their own—a case of chronic pulmonary trouble, at last ending fatally after rupture of a large abscess, in the expectoration of which *Trichomonas intestinalis* was found, along with a multitude of other "germs." Post-mortem almost the whole of the lower left lung was on the road to gangrene and more or less infiltrated with pus, *T. intestinalis* being abundant in the morbid area, but *not* elsewhere. The authors are content to emphasize this last fact.

A. A.

HARTWELL (J. B.). [*Trichomonas vaginalis* **Vaginitis.**]—*Colorado Med.* Denver. 1922. Apr. Vol. 19. No. 3. [Summarized in *Jl. Amer. Med. Assoc.* 1922. May 13. Vol. 78. No. 19. p. 1488.]

Deals with treatment, the principle of which is to keep the vagina strongly alkaline, the alkalinity seeming to be fatal to the flagellate.

A. A.

DA CUNHA (Aristides Marques) & JULIO MUNIZ. **Sobre um flagellado parasito do gato. (Nota prévia.)**—*Brazil Medico.* 1922. June 3. Year 36. Vol. 1. No. 22. pp. 285–286. With 1 text fig.

Description and figure of a "new" Trichomonas (*T. felis*) from the large intestine of a cat.

A. A.

SIMON (Sidney K.). **Further Observations of** *Lamblia intestinalis* **Infestation and its Treatment.**—*Southern Med. Jl.* 1922. June. Vol. 15. No. 6. pp. 458–462.

Abstracts of eight cases—three of them under ten years of age—of infection with *Giardia intestinalis.* In all there was abdominal pain or discomfort due to gas. In five there was not any history of diarrhoea, in the other three irregular outbursts of diarrhoea alternated with constipation. In one case the gall-bladder was inflamed, and large numbers of free forms of the parasite came away in the drainage; it is conceivable that the parasite may have infected the gall-bladder with bacteria from the intestine. Six of the cases here reported were treated with arsphenamin, in one case through the duodenal tube, in the other five intravenously; in every instance cysts at once disappeared from the stools, and, so far as the author can learn, have not reappeared.

A. A.

KNIGHTON (J. E.). *Lamblia intestinalis* **with Report of Cases.**—*Southern Med. Jl.* 1922. June. Vol. 15. No. 6. pp. 457–458.

Remarks on three cases in which an infection with *Giardia intestinalis* was discovered by duodeno-biliary drainage for chronic cholecystitis. The parasites had invaded the bile-ducts and gall-bladder, but it is not stated that they actually caused the cholecystitis. Only one of the cases had been troubled with diarrhoea, and that one many years before. Duodenal lavage or duodeno-biliary drainage gives only temporary relief.

A. A.

DE BUEN (S.). **El** *Lamblia intestinalis* **en Espana.**—*Laboratorio.* Mar. 21. Vol. 5. pp. 923–927. [Summarized in *Bull. Inst. Pasteur.* 1922. June 30. Vol. 20. No. 12. p. 494.]

Three cases of Lamblia infection in children of three years; said to be the first cases reported in Spain.

A. A.

KOTLÁN (A.). **Giardien (Lamblien) in Vögeln.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Mar. 14. Vol. 88. No. 1. pp. 54–57. With 2 text figs.

The author figures two species of Giardia (=Lamblia), one from the red-backed shrike, the other from the avocet. In both birds there was wasting and intestinal inflammation, which the author is inclined to attribute to the parasite.

A. A.

GLASER (R. W.). *Herpetomonas Muscae-domesticae*, **its Behaviour and Effect in Laboratory Animals.**—*Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 99–108. With 1 plate.

Working at Princeton the author found house-flies to be particularly well infected with *Herpetomonas muscae-domesticae* in the months July–September. Injecting (per peritoneum) six mice, a rat, and a guinea-pig with the intestinal contents of such flies, he obtained no positive results of any kind. The blood of all the animals was examined at frequent intervals, two of the mice were autopsied at the end of a month, two after two months, the other two and the rat after three months; no parasites were found in the blood, and all the organs in every autopsied case were normal and free from parasites. The guinea-pig at the end of five months is still alive; at no time did it have fever or lose weight.

A. A.

i. ROUBAUD (E.) & FRANCHINI (G.). **Infection naturelle de la souris par les flagellés de la puce** *Ctenopsylla musculi*, **Dug.**—*Bull. Soc. Path Exot.* 1922. June 14. Vol. 15. No. 6. pp. 405–406.

ii. —— & ——. **Infection leishmaniforme produite chez la souris par l'inoculation des fèces de la puce** *Ctenopsylla musculi.*—*Ibid.* p. 407.

i. In October an adult mouse is put in a jar with some *Ctenopsylla musculi* with a view to raising a crop of the fleas. In January following there are so many fleas that the mouse has to be taken away from them. The mouse, however, remains sick and sorry, and on March 23 is found dead. At the autopsy the spleen is voluminous; there is ascites; round or piriform bodies, with or without blepharoplast, are abundant in smears of spleen, and are also found in liver, lungs, and bone-marrow, and occasionally in blood smears. [Some fleas examined at the time of the removal of the mouse had shown *Herpetomonas ctenopsyllae.*]

On March 24 mouse No. 2 receives a subcutaneous inoculation of spleen-juice of mouse No. 1. On June 9 it is killed; its spleen is hypertrophied, and some of the leishmaniform parasites are found in it and the other organs.

On March 15 mouse No. 3 had been placed in the flea-jar where the fleas were abundant. On March 31 it is dead. Its spleen is enormous; some leishmaniform parasites are found in it and the other organs, and there are some in blood smears.

On May 15 mouse No. 4 is placed in the flea-jar where a few fleas remain. It is killed on June 9. Its spleen is slightly enlarged and shows some of the parasites.

On March 1 mouse No. 5 had been placed in the flea-jar where the fleas were very numerous. Its blood, when examined on March 15 and 20 and April 2, showed some leishmaniform or uninuclear parasites, some endoglobular and some free. It died on April 15. Its spleen is found to be enormous; numerous parasites are found in it, and some also in smears of liver, lung, and bone-marrow, a few also in blood smears.

On April 15 mouse No. 6 had been placed in the flea-jar where the fleas were very numerous. The blood examined on April 20 did not disclose any parasites, but on May 2 one parasite was found in a smear. On May 10, when the animal was killed, its spleen was enlarged. Smears of blood, liver, and spleen—but not of lungs and bone-marrow—showed a few of the parasites.

ii. The dead mice of the above experiments were covered with dried excrements of *Ctenopsylla musculi*. Some of the excrement, at least 24 hours old, ground down in physiological saline, was injected under the skin of a nearly adult mouse. Fifteen days afterwards, and onwards, rare leishmaniform parasites could be found in the blood. On the 69th day the mouse was killed ; its spleen was hypertrophied and leishmaniform parasites were present in smears of spleen, liver, lungs, kidneys, bone-marrow and blood.

[It is to be noted that in the parasites described in this experiment as leishmaniform the blepharoplast is stated to have been " rarement bien visible."]

A. A.

BUCHNER. **Sind die Crithidien der Schaflaus für Mäuse pathogen?** [Is the Crithidia of the Sheep-Ked Pathogenic to Mice?]—*Ztschr. f. Hyg. u. Infektionskr.* 1922. Vol. 95. No. 1. pp. 115–118.

This paper has a critical bearing on the subject of insect flagellates as the source of leishmaniasis of vertebrates [see this *Bulletin*, Vol. 18, p. 12]. LAVERAN and FRANCHINI (*Bulletin*, Vol. 15, p. 148) succeeded in infecting white mice with crithidia from the ked ; the infection was pathogenic to the mice and gave issue among other things to leishmanic forms. This result is rather surprising, since NÖLLER has given good reasons for regarding the crithidia of the ked as an antecedent form of the specific trypanosome of the sheep.

The author of the present paper has repeated the experiments of LAVERAN and FRANCHINI. He has injected fresh material from the gut of the ked, along with physiological saline solution, under the skin and into the peritoneal cavity of white mice, and also has fed white mice with the same material. His experiments are here fully described and recorded. In no case has he succeeded in infecting white mice with crithidia of the ked, or observed the phenomena described in the account of the LAVERAN and FRANCHINI experiments.

A. A.

CONNAL (A.) & YOUNG (W. A.). **A Case of Human Coccidiosis in Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 90–93. With a Note by Clifford DOBELL.—pp. 93–94.

The patient in this case had never been out of England before his departure for West Africa. During the two years prior to seeking medical assistance in West Africa he had had several attacks of diarrhoea. After coming under treatment his faeces were constantly examined ; they were found to contain epithelial cells, pus cells, Charcot-Leyden crystals, a few doubtful and degenerate *Entamoeba histolytica* on one occasion only, and on four successive occasions oocysts of a coccidium which were identified as *Isospora hominis*—an identification subsequently confirmed by DOBELL. Under emetine and alcresta all signs of intestinal confusion ceased and the patient improved rapidly, although epithelial cells and pus cells were still observed in the stools for some time.

A. A.

BRUG (S. L.). **Coccidiose bij den mensch.** [Coccidiosis in Man.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 3. pp. 363–371. With 1 plate.

Three cases of infection with *Isospora hominis* in persons who had never left the Dutch East Indies. Two were healthy, the third suffered from subacute diarrhoea, probably not due to the Coccidia.

Brug is in doubt, whether the Eimeria, found by SNIJDERS in a human stool (see this *Bulletin*, Vol. 18, p. 187), is to be considered as a human parasite. The fact that natives of eastern countries often eat insects, as well as animal intestines and livers, may explain the temporary, occasional presence of great numbers of unusual cysts in the stools. SNIJDERS found degenerated besides sound-looking cysts; Brug thinks that this may be induced by uneven action of noxious influences (partial heating) on the cysts during the preparation of the infectious meal.

W. J. Bais.

SHORTT (H. E.). **Review of the Position of the Genus** *Haemocystidium* **(Castellani and Willey, 1904), with a Description of Two New Species.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 814–826. With 1 coloured plate.

The species of "Haemocystidium" are considered in historic sequence and good reasons are given for the conclusion that they all ought to be included in the genus *Haemoproteus,* of which "Haemocystidium" then becomes merely a synonym. The species of Haemoproteus as thus conceived are listed in chronological order. The list includes two new species (*H. phyllodactyli* from *Phyllodactylus elisae,* and *H. grahami* from *Agama nupta* var. *fusca*), which are described and figured. A list of references to original papers completes the business.

It is thus that all new species ought to be introduced into zoology.

A. A.

WALCH (E.). **Sur les "Black spores" et autres corps chitinisés dans les Anophèles.**—*C.R. du 4ième Congrès de "Far Eastern Assoc. of Trop. Med."*—7 pp. With 2 plates. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

The author agrees with BRUG that the "black spores" seen in Proteosoma-infected Culex and malaria-infected Anopheles are degenerated oocysts encapsuled in chitinous deposit. He has seen similar spores in Anopheles not infected with malaria, and has also seen a hyphomycetes, that had found its way through the oesophagus of a mosquito, enveloped in chitin. Also one may sometimes find sporozoites chitinized in the abdomen far from the stomach.

A. A.

SERGENT (Edm. & Et.) & PARROT (L.). **Sur une hémogrégarine de l'homme, observée en Corse.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 193–197. With 1 fig.

The haemogregarine here described and figured as a new species, *Haemogregarina elliptica,* was observed in a Corsican girl of three years, free from malaria and apparently in good health; 2 in 16 were lodged in red corpuscles, the rest were free in the blood. The infected corpuscles were neither enlarged nor otherwise altered in appearance; the included parasites were small slender subcrescentic rods, with a homogeneous non-vacuolated cytoplasm, a compact nucleus lying to one side near the middle, and a large chromatin granule; they are regarded as merozoites. The free parasites are elongate-elliptical, sometimes subreniform, and never have a recurved "tail"; most of them are 5–6μ long, but one was only 1–2μ and some were as much as 10–11μ, and between these extremes every gradation was observed. Among the forms over 5μ long, some were encapsulated; others were elliptical cysts with a friable nucleus and numerous granules of chromatin; others still were elongate cysts with two polygonal nuclei—probably schizonts.

In form and size this species differs from *H. hominis* Krempf (1917), and in size and the absence of a recurved tail from *H. inexpectata* Roubaud (1919); but it shows some approximations to the parasite described by FEDOROVITCH in a case of splenomegaly in 1916 and thought by CASTELLANI to be similar to his *Toxoplasma pyrogenes* [see this *Bulletin*, Vol. 8, p. 424].

A. A.

SHORTT (H. E.). **Notes on Two Haemogregarines of Persian Lizards.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 827-829. With 1 plate.

The two new species of Haemogregarines here described—*Haemogregarina procteri* from *Phyllodactylus elisae*, and *Haemogregarina percomsi* from *Agama nupta* var. *fusca*—are, so far as the forms seen in the blood-circulation go, alike, and of the common reptilian type; but their schizogony forms are different.

In *H. procteri* two kinds of schizogony were observed: (*a*) in red cells in spleen and liver and in capillaries of lungs, resulting in destruction of the red cell and the formation of small merozoites; and (*b*) in the endothelial cells of the air-spaces of the lungs, resulting in the formation of large sausage-shaped merozoites. In *H. percomsi* only the latter form of schizogony was observed.

A. A.

LYNCH (Kenneth M.). **Blastocystis Species in Culture. A Preliminary Communication.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 215–220. With 1 plate.

The author has cultivated Blastocystis in blood serum and in albuminous exudates, pure, or diluted with Noll solution of varied strength. In his cultures he has observed three methods of reproduction, namely, (1) fission (commonly, but not always, binary), (2) peripheral gemination (which may be regular and symmetrical or not, and may occur while fission is in progress or afterwards), and (3) a process resembling endosporulation (a complicated process, one phase of which suggests sexual conjugation). He considers that these three methods are evidence of specific distinction.

A. A.

MARZINOWSKY (E. J.). [**On** *Grahamella.*]—Reprinted from *Medicinskoye Obozreniye* (*Med. Review*). Moscow. 1917. No. 1–2. 4 pp. With 1 plate.

After a brief historical survey of the question, the author records his finding of Grahamella in the blood of cattle—in the red corpuscles and free in the serum. Similar bodies were encountered within large cells of the type of macrophages in the intestine of a tick, *Boophilus calcaratus*, collected from an infected animal. The author refers these bodies to the Protozoa, and believes that they are transmitted to cattle through the bite of the tick. He proposes to name them *Grahamella bovis*. The paper is illustrated by three photomicrographs.

C. A. Hoare.

MESNIL (Félix). **La "Flagellose" ou "Leptomoniase" des euphorbes et des asclépiadacées.**—*Ann. Sci. Nat., Botanique.* 1921. Dec. Vol. 3. No. 5–6. pp. 42–57. With 4 text figs.

This is a convenient summary of recent work on the subject.

The author starts with the discovery, in 1909, by Surgeon-Major A. LAFONT and his attendant DAVID, of *Leptomonas davidi* in the milky juice of Euphorbias, the confirmation of this discovery in many parts of the world, and the discovery by FRANÇA, in 1920, of the evolution of the parasite in the Coreid bug, *Stenocephalus agilis*.

Almost all the susceptible species of Euphorbia are annuals; the commonest is *E. pilulifera*. The author gives a distributional list of numerous other species.

Infection, though it may occur in any part, even in the unripe wall of the seed-capsule, is commonly localized in the individual plant—one branch may be infected and the next branch not. It is pathogenic to the affected part of the plant. The author mentions the experimental infection of plants by inoculation obtained by NOC and STÉVENEL; also the experimental infection of *Euphorbia sauliana* and *pilosa* with cultures of *Leptomonas ctenocephalus* of the dog-flea, effected by LAVERAN and FRANCHINI. *Leptomonas davidi* is described and figured as it occurs in the plant, and also as it occurs in the insect-carrier, after the original account given by FRANÇA. LAFONT's discovery of a Leptomonas in the gut of a Lygaeid bug of the genus *Nysius* and his experimental transmission of the infection from the bug to a Euphorbia is mentioned, a discovery confirmed by LAVERAN and FRANCHINI.

Leptomonas elmassiani and *bordasi*, discovered by MIGONE, in Paraguay, in the milky juice of the Asclepiads *Araujia angustifolia* and *Morrenia odorata* respectively, are mentioned. The first-named was subsequently noticed by CORDERO in Uruguay, where it was associated with a bug, *Oncopeltus lactuosus*. *Leptomonas apocynae*, discovered by FRANCHINI in two species of Apocynaceae, is noticed in a postscript.

The paper concludes with a bibliography.

A. A.

FRANCHINI (G.). **Amibes et autres protozoaires de plantes à latex du Muséum de Paris. (Note préliminaire.)**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 197–203.

The author has examined the juice of numerous plants in the Jardin des Plantes of Paris—mostly plants with a milky juice—and in a good many species he has found amoebae, and in some Flagellates also (Herpetomonas, Crithidia, and Trypanosoma). He succeeded in cultivating amoebae, from *Ficus carica* and two species of Strophanthus, upon horse-blood-agar (NÖLLER's medium), and observed the amoebae to have ingested red blood cells. He inoculated mice with juice of a Euphorbia containing trypanosomes; the inoculation was generally well tolerated, and in two mice he has up to the present found a single trypanosome. Among the parasites observed by him in plants were some resembling the debated forms lately figured by Mrs. ADIE in the bed-bug believed to be infected with kala azar, and also some resembling Mrs. ADIE's nematode-like forms.

The following is a list of the plants and their parasites :—

EUPHORBIACEAE : Trypanosomes in *Elaeophorbia drupifera, Euphorbia calyculata* and *Exoecaria emarginata*; leishmaniform bodies in *Manihot dichotoma*; amoebae in *Euphorbia verticillata* and *M. dichotoma.*

ASCLEPIADACEAE : amoebae in *Chlorocodon whitei* and *Cryptostegia grandiflora*; and crithidia also in the latter.

APOCYNACEAE : amoebae in four species of Strophanthus, in species of Acocanthera and Thevetia, in *Cerbera odollam* and *Caudrunia javensis*; and large trypansomes devoid of flagellum in the last.

ARTOCARPACEAE : amoebae in *Ficus benjamina, F. pierrei, F. tholloni,* and *F. carica, Antiaris toxicaria* (Upas tree), and *Lakoocha artocarpus*; trypanosomes in *F. benjamina* and leishmaniform bodies in *F. tholloni.*

SAPOTACEAE : amoebae in species of Chrysophyllum, Labramia, Tregulia, Mimusops, and Sideroxylon; trypanosomes without flagellum in two species of Chrysophyllum; herpetomonas in *Sideroxylon inerme*; and flagellates of some sort in *Mimusops schimperi.*

MENISPERMACEAE : small round or oval parasites in *Stephania rotunda.*

ANACARDIACEAE : a small round multinuclear parasite in *Oncocarpus vitiensis.*

A. A.

i. FRANCHINI (G.). **Remarques à propos de la note de M. França sur la** *Flagellose des Euphorbes.*—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 205–207.

ii. ——. **Sur une amibe des figuiers de plein air de la région parisienne et sa culture.**—*Ibid.* May 10. No. 5. pp. 287–292. With 3 text figs.

iii. ——. **Flagellés et amibes d'une Urticacée exotique,** *Ficus parietalis.*—*Ibid.* June 14. No. 6. pp. 399–404. With 3 text figs.

i. Franchini, while admitting that the bug *Stenocephalus agilis* may be the intermediary of *Leptomonas davidi* in Portugal, gives reasons—with which ROUBAUD concurs—for assigning the part of intermediary to other species of bugs in other countries.

ii. In this paper an amoeba obtained from *Ficus carica,* a tree that grows in the open air in Paris, is described and figured. The amoeba could be found in cold, snowy weather. It can be cultivated in Nöller's horse-blood medium, and has a tendency to ingest the red blood cells. In its development a flagellar phase may be observed. The author thinks it probable that the trees are infected by the flies that swarm about the branches and fruit.

iii. Here are described and figured forms of Herpetomonas and trypanosome, and small bodies some of which have a leishmaniform appearance, from the fruit of *Ficus parietalis,* also various forms of crithidia and amoeba from the sap of the same plant. Some of the crithidia-forms are said to resemble the " nematode-like structures " mentioned by Mrs. ADIE in her recent investigations into kala azar.

A. A.

FRANÇA (C.). **Sur les flagellés parasites des latex (à propos de la note de M. Franchini).**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 408–410.

The author expresses the opinion that although *Stenocephalus agilis* may be the intermediary in infecting Euphorbias with *Leptomonas davidi* in Europe and North Africa, other Hemiptera may transmit the infection mechanically in other areas.

A. A.

ANIGSTEIN (Ludwik), with RAABE (H.). **Serological Researches on Protozoa.**—*Jl. Trop. Med. & Hyg.* 1922. Aug. 1. Vol. 25. No. 15. pp. 241–246.

The authors worked with a flagellate which they identified as *Bodo edax* Klebs, Kuhn. They found that the flagellate could be cultivated in enormous numbers on 1 per cent. agar plates covered with a thin layer of 1 per cent. peptone water (or of 5 per cent. broth), to which was added one drop of emulsion of a growth of water-bacteria on ordinary agar—the bacteria being essential to the nutrition of the Bodo. They immunized rabbits to mixed cultures of the Bodo and bacteria, and working with the immunized serum they did not find any lytic substance in it, but they found (1) that it agglutinated the Bodo in large agglomerations which retained collective movement, and (2) that it contained antibodies that fixed the complement in the presence of the Bodo, and also complement-fixatives against the bacteria with which the Bodo was cultivated. Inhibition of haemolysis was stronger in tubes containing the double antigen than in tubes containing only bacterial antigen.

A. A.

NOWLIN (Nadine). **Correlation of the Life Cycle of a Parasite with the Metamorphosis of its Host.**—*Jl. Parasit.* 1922. June. Vol. 8. No. 4. pp. 153–160. With 6 plates.

The gregarine of which the life-cycle is here described and figured is a new species, *Schneideria metamorphosa* (sic), parasitic in the fly, *Sciara coprophila*, and the several phases in the development of the parasite and host are stated to be reciprocally correlated. In the larva of the fly the young gregarine begins as an intracellular parasite, and emerges into the lumen of the gut as a monocystid. In the pupa the sporonts pair and begin to encyst and to segment. In the adult fly the formation of spores is completed and the preliminaries for production of sporozoites begin.

A. A.

HILL (G. F.). **Notes on the Habits and Distribution of Some North Australian Culicidae.**—*Commonwealth of Australia, Dept. of Health. Service Publication No. 21.* 32 pp. With 11 illustrations.

The Culicidae of this memoir number 34 species, including *Culex fatigans*, *Stegomyia fasciata* and two species of Anopheles, namely, *A. annulipes* and *A. barbirostris* var. *bancrofti*.

A. annulipes has a very wide range in Australia, and appears to be a most adaptable species, its larvae having been found in waters so diverse as brackish marshes, puddles and hoof-prints in fresh-water swamps, stagnant pools and hoof-prints in sandy creeks, grassy soakage, clear rock-pools with a current, margins of rapid streams, wells, irrigation-channels, and liquid-manure pits. It bites at any time of day and night, and cold, windy nights are not deterrent. Though there are seasonal oscillations, both adults and larvae can be found throughout the year.

The range of *A. barbirostris* seems to be limited to the coastal tracts of Queensland and the Northern Territory. Its larvae are usually found in grassy and weedy swamps, but have been noticed in a shallow well. It is seldom found in houses.

A. A.

EVANS (Alwen M.). **Notes on Culicidae in Venezuela, with Descriptions of New Species. Part II.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 213–220. With 1 plate.

Description, based on a single female specimen, of a " new species " of Anopheles (*A. venezuelae*), which in a postscript is conjectured to be a variety of *A. punctimacula.*

A. A.

ROOT (Francis Metcalf). **Notes on Mosquitoes and other Blood-Sucking Flies from Porto-Rico.**—*Amer. Jl. Hyg.* Baltimore. 1922. July. Vol. 2. No. 4. pp. 394–405. With 5 text figs.

Includes a list of all the species of blood-sucking flies known to exist in the island of Porto Rico. The local species of Anopheles are *A. albimanus* and *A: grabhamii.*

A. A.

WATERSTON (J.). **Malaria in Macedonia, 1915–1919. Part V. Entomological Observations on Mosquitoes in Macedonia.**—*Jl. Roy. Army Med. Ccrps.* 1922. May. Vol. 38. No. 5. pp. 334–349.

These entomological observations relate to 28 species and two varieties of Culicidae. Six species and two varieties of Anopheles are included, namely, *A. maculipennis* and a variety, *A. bifurcatus, A. algeriensis, A. plumbeus, A. superpictus, A.* " *hyrcanus* " [better known as *sinensis*] and its variety *pseudopictus. Stegomyia fasciata* was common, but only in Salonica. *Culex fatigans* was not observed at all. The larva of a water-beetle—a species of Acilius—was observed to be very destructive to larvae, more particularly to those of Culicines.

A. A.

EDWARDS (F. W.). **A Synopsis of Adult Oriental Culicine (including Megarhinine and Sabethine) Mosquitoes. Part I.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 249–293. With 3 plates.

The Culicines of this paper include the Megarhines and the Sabethines.

This first instalment contains a key to the Oriental genera and keys to the Oriental species of the three genera Aëdes, Lutzia, and Culex ; also descriptions and diagnoses of new Oriental species of these and other genera.

Further notice may be deferred until the rest of the paper appears.

A. A.

EDWARDS (F. W.). **Mosquito Notes. III.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 75–102. With 3 text figs.

A miscellany of notes and descriptions of mosquitoes from Paraguay, British Guiana, Nyasaland, India, Australia, New Guinea, and New Caledonia, including a taxonomic revision of the Ethiopian species of Culex, a confirmation of THEOBALD's Anopheline genus *Bironella,* a description of a new Aëdes (*A. woodi*) much resembling *Stegomyia fasciata,* and some corrections of the author's paper on Palaearctic Mosquitoes.

A. A.

HAWORTH (W. E.). **[Discovery of a New Breeding Place for Mosquitoes.]** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. p. 201.

The author has observed in Dar-es-Salaam mosquito larvae in the tops of coconut palms. Between January and June of the present year 1,673 palms produced 1,549 collections of larvae, among which *Culex fatigans* and *Stegomyia fasciata* were predominant, but among other species *Anopheles costalis* were recognized.

[In Samoa O'CONNOR observed *Stegomyia scutellaris* breeding in empty pods of the cocoa-tree (*Theobroma cacao*) still attached to the branches.]

A. A.

MARSHALL (John F.). **"Unofficial" Mosquito Control in England.**—*Science Progress.* 1922. Jan. Vol. 16. No. 63. pp. 462–468. With 1 plate.

——. **The Destruction of Mosquito Larvae in Salt or Brackish Water.** —*Hayling Mosquito Control. Circular No. 4.* 4 pp.

Hayling Island was divided into 18 administrative sections, each in charge of a secretary, and all possible breeding-places were charted. A number of experiments with paraffin oil were carried out, but a larvicide considered to be more generally useful and less expensive was a liquid containing 15 per cent. of soluble cresol. This liquid in a dilution of 1 in 16,000 was found to kill larvae of *Ochlerotatus detritus* in one hour, in a dilution of 1 in 32,000 in an hour and a half, and in a dilution of 1 in 48,000 in three hours and a half. The volume of water in any given pond or channel is first calculated, and then the amount of cresol solution necessary to effect the required dilution. It was found possible to apply the cresol solution in an ordinary watering can having a rose.

A. A.

SEN (S. K.). **A Note on the Effects of Mercurous Chloride on Culicid Larvae.**—*Report of Proc. of 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 184–191. With 2 plates.

An exceedingly minute quantity of calomel in water—to be exact 0·001 gm. in 100 cc.—is quickly fatal to larvae of *Stegomyia albopicta*, whereas a 0·001 per cent. solution of corrosive sublimate is not. "The pupae were generally unaffected."

How calomel acts is something of a mystery, since it is so very slightly soluble in water.

A. A.

BUXTON (P. A.). **On Fish and Mosquitos in Palestine.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 203–204.

One of the greatest difficulties of antimosquito work in Palestine is a series of littoral swamps, the outlets of which are blocked by sand-dunes; and, besides, there exist other large marshy areas which can only be drained at excessive cost. In such circumstances the author has been at very great pains to discover whether the fishes living in these swamps and marshes can be relied on for assistance. He has examined the stomachs of a large number of these fishes—several species of Cyprinodonts, a species of grey mullet, and a Tilapia—but in none of them were Culicid larvae found. On the other hand, by careful comparison in the field between isolated pockets of water and waters which little fishes could reach, he has collected some circumstantial evidence of the efficacy of *Cyprinodon calaritanus, C. sophiae* and *C. fasciatus,* and the young of *Tilapia zillii* against larvae of *Ochlerotatus caspius* and *Culex perexiguus.*

A. A.

DUBOIS (Raphaël). **Sur la destruction des moustiques par les anguilles et le repeuplement des cours d'eau, étangs, etc.**—*C.R. Acad. Sci.* 1922. Sept. 4. Vol. 175. No. 10. pp. 431–432.

The author speaks highly of the destructive powers of elvers against mosquito larvae.

A. A.

MILLER (David). **A Remarkable Mosquito,** *Opifex fuscus,* **Hutton.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 115–126. With 24 text figs.

This remarkable New Zealand mosquito is found only on the coast of that country, and breeds in the rock-pools left by high tides. The adults themselves rest and trip on the surface of the pools. The eggs are laid, singly, on the rocks. The larvae are carnivorous; they can stay below water for a long time, browsing in the sandy bottom.

The insect, which was originally described as a Tipulid under the name of *Opifex fuscus,* is now—having been assigned to its proper place among mosquitoes by Mr. G. V. HUDSON and also by Mr. F. W. EDWARDS—very fully described and figured in its larval, pupal, and adult stages by Mr. Miller, who considers that it should be separated as a distinct subfamily next to the Megarhini.

A. A.

BRUG (S. L.) & DE ROOK (H.). *Bironella gracilis* **Theobald 1905. (Sous famille** *Anophelinae.*)—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 305-310. With 12 figs. in text.

The Anopheline genus, *Bironella,* and species *B. gracilis,* was founded by THEOBALD in 1905 on male insects from New Guinea. The authors have found adults and larvae of the species in plenty in virgin forest on the northern coast of New Guinea, the larvae in peaty bogs in the forest, and they now describe the female and larva and redescribe the male, figuring certain parts of each.

The species, which is characterized by the Uranotaenia-like brevity of the first fork-cell (second marginal), is confirmed in the Anopheline group. The female has comparatively short palps, varying in length from 60 to 67 per cent. the length of the proboscis. The male also has shortish palps (varying from 80 to 87 per cent. the length of the proboscis), and has genitalia of an uncommonly simple kind. The larva has a conspicuous plume near the middle of the inner aspect of the antennal shaft.

Though the authors' camp was near the forest, no Bironella was detected among the Anopheles that infested it.

A. A.

LAMBORN (W. A.). **Some Problems of the Breeding-Places of the Anophelines of Malaya: A Contribution towards their Solution.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 1–23. With 1 text fig.

The main result of the judicious investigations here recorded in detail is to support the argument that in the matter of breeding-places the different species of Anopheles are selective to a remarkable degree, but that the selective tendency depends not so much on the obvious features of the environment, but rather, as Malcolm WATSON has expressed it, on "something in the water." The author has concentrated on *A. aconitus*, the breeding-places of which he has subjected to prolonged and critical examination, and he comes at last to the conjectural conclusion that "some quality of the water strongly affects the distribution of *A. aconitus*, either directly or indirectly, by influencing the character of the food" of the larva.

The author appears to be in full agreement with Malcolm WATSON as to the possibility of discovering some biological method of control over the dangerous species of Anopheles by influencing and altering the character of the water in which their larvae thrive. Such alteration may be brought about by altering the gross and obvious environment, as when the larvae of *A. umbrosus* disappear as their pools are deprived of shade ; or by effecting some change in the composition of the water or of its alga-flora by subtler methods, as when the larvae of *A. maculatus* are observed to disappear with the spread of a felted alga that flourishes in water that is fouled in certain ways.

A. A.

LAMBORN (W. A.). **The Bionomics of Some Malayan Anophelines.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 129–149. With 1 text fig.

Papers of this kind, consisting almost entirely of the detailed and very carefully qualified observations, experimental and other, of a highly competent and far-seeing observer cannot be abstracted ; they have to be given in full. As this course is not practicable here, we must select a few conclusions of practical interest.

Everyone knows the difficulties of breeding-up Anopheles larvae in the workroom. The author at last discovered that all the open-country species could be brought up easily in polluted water containing an almost pure culture of Eugloena (probably *E. viridis*).

The reproductive capacity of Anophelines is another important subject upon which we here find several pages of exact statistics of egg-laying by captive females of several species. The maximum number of eggs obtained from a single female was as follows for each species : *A.* "*hyrcanus*" [also called *sinensis*] 188, *A. barbirostris* 293, *A. maculatus* 300, *A. vagus* 273, *A. subpictus* var. *malayensis* [alias *A. rossi* Giles] 114, *A. karwari* 97, *A. ludlowi* 120, *A. aconitus* 117, *A. kochi* 110, *A. fuliginosus* 95, *A. tessellatus* 49.

Experiments as to the fate of eggs exposed to vicissitudes fill several pages. We can only show their drift, merely remarking that almost all the experiments were technically controlled. Some fresh laid eggs of *A. vagus* were transferred to moist mud and there left in a drying breeze for 48 hours, when water was added to float them off ; none ever hatched. About 68 two-nights'-old eggs of *A. vagus* were allowed to dry ; 24 hours afterwards 25 of them were replaced in water, and in about 24 hours afterwards 14 larvae had hatched; the remaining 43 two-nights'-old eggs were allowed to dry for 48 hours before being restored to water, and 23 of them hatched. These experiments, showing that fresh eggs cannot endure drying, but that older eggs, in which embryonic development has made some progress, can retain their vitality for 72 hours when dried, were confirmed for other species besides *A. vagus*. Experiments showed also that fresh eggs, if placed on fairly moist filter paper guarded from evaporation, would produce larvae that lived all right when put into water.

With few exceptions the open-country Anophelines dropped their eggs between the hours of 8 p.m. and 6 a.m.

The length of larval life was found to vary even in the issue of eggs laid in the same day and of larvae kept under the same conditions—10–13 days for *A. tessellatus*, 10–14 days for *vagus* and *ludlowi*, 11–16 days for "*rossi*" and *kochi*, 12–17 days for *A. maculatus*, 19–31 days for *barbirostris*, etc.

Larvae taken from water soon succumbed even in a moist atmosphere, but pupae removed on blotting-paper and kept in a moist atmosphere survived and fulfilled their term without hurt or retardation.

Pupation generally took place during the night. The pupal term was always 36–48 hours.

Emergence also usually took place during the night. Of *A. vagus* 49 "families" were watched ["family" being used in the colloquial sense], and in "no single family was there marked inequality of sexes."

As regards the hook-filaments of the tail-tufts, some species of larvae were noticed to use them persistently, others only occasionally for attachment.

As regards natural enemies of Anopheles larvae. If, as is alleged, Chironomus larvae are hostile, it is more probable that they starve the Anopheles by using Anopheles food for their own larva-cases than that they openly attack the Anopheles. In certain ponds where Anopheles larvae were never found Belostomatid bugs and larvae of "Neuroptera" were particularly abundant.

A. A.

SWELLENGREBEL (N. H.). **Tijdelijke en plaatselijke ophooping van *Anopheles maculipennis* om Amsterdam.** [Temporary and Local Accumulation of *Anopheles maculipennis* round Amsterdam.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. 2nd Half. No. 4. pp. 350–359. With 2 text figs.

The following observations are of general interest:—Heavy shadow makes life impossible for the larvae of *Anopheles maculipennis*. High salt concentration seems harmful to the larvae, but artificially increasing it is impracticable as the ditches serve as watering places for the cattle. Narrow ditches are more suitable as breeding-places than broad ones. A distance of about two miles from the nearest house or stable does not prevent a pool becoming a breeding-place.

W. J. Bais.

ILTIS (Hugo). **Ueber die Verbreitung der Malariamücken in Mähren und ueber die Gefahr einer Malariaendemie.** [The Range of Malarial Mosquitoes in Moravia and the Risk of Malaria becoming Endemic.]—29 pp. 1921. Brünn. Im Selbstverlage des Verfassers.

This is a very good article of a semi-popular kind. One of the best things in it is an aphorism of ZIEMANN: "Die Malaria ist cum grano salis eine Krankheit der Unkultur."

A. A.

IYENGAR (M. O. Tirunarayana). **A Preliminary Note on New Thoracic Appendages in Anopheline Larvae.**—*Report of the Proc. of the 4th Entom. Meeting held at Pusa on the 7th to the 12th Feb., 1921.* pp. 216–217. With 1 plate.

What this observant author describes should hardly—unless by a transcendentalist who assumes wings and breathing-trumpets to be appendages—be called " appendages."

[The reviewer is ashamed to confess that he had never noticed the structures here described before, but he now finds them to be represented not only in full-grown Anopheles larvae, as the author has discovered, but also in full-grown larvae of Culex, Theobaldia, Stegomyia, Toxorhynchites, and Eretmapodites. They are not always easy to see, and when detected they are not always the prominent lobes described by the author. Examination of a considerable series of the " appendages " discovered by Mr. Iyengar shows them to be the beginnings of the breathing-trumpets of the prospective pupa.]

A. A.

EDWARDS (F. W.). **On Some Malayan and Other Species of** *Culicoides*, **with a Note on the Genus** *Lasiohelea*.—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 161–167. With 1 plate.

Culicoides sucking blood from an Anopheles distended with fresh human blood is a phenomenon that has been often observed and in several different places. In this paper is described and figured a Malayan *Culicoides anophelis* that has been seen making free in this way with individuals of no less than 11 species of Malayan Anopheles.

A. A.

CARMENT (A. G.). **[Report on Experiment of Fly Breeding from Stable Manure, with a Short Account of the Finding of a Parasite.]**—*Agric. Circular Fiji Dept. Agric.* Suva. 1922. Jan.–Mar. Vol. 3. No. 1. pp. 1–5. [Summarized in *Rev. Applied Entom.* 1922. Aug. Vol. 10. Ser. B. Pt. 8. p. 169.]

A parasitic Hymenopteron has been observed recently, in Fiji, attacking puparia of the house-fly. The Hymenopteron is present in the manure heap along with the maggots, but it does not become active until the heap begins to dry and the maggots have pupated. It is conjectured that an extraordinary reduction of house-flies that occurred in certain parts of Fiji some years ago may possibly have been due to this Hymenopterous parasite.

Some experiments made by this author showed that house-flies will travel against wind " evidently following a scent."

A. A.

BOYD (J. E. M.). **Entomological Notes : On a Muscid Fly Breeding on a Ship at Sea.**—*Jl. Roy. Army Med. Corps.* 1922. May. Vol. 38. No. 5. pp. 378–379.

During the voyage from England to India of a hired transport, flies—some undetermined species of Musca—were noticed to increase in numbers daily ; and as the ship was not near land it was evident that they were bred on board, in fact a newly emerged individual with wings still furled was actually caught, and one of the stewards said that the ship always carried what he called "sea-flies." On a previous voyage blue-bottles were seen, but this had been explained by a faulty refrigerator pipe. An outbreak of influenza cut the investigation of the origin of the Musca short. Nothing is said about the antecedents of the ship.

A. A.

KUHN (Philalethes). **Untersuchungen ueber die Fliegenplage in Deutschland.** [The Fly Plague in Germany.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. May 22. Vol. 88. No. 3. pp. 186–204. With 1 chart in text.

Between June, 1915, and May, 1917, inclusive, 532 dwelling-rooms and stables, etc., in Alsace and Baden were furnished with fly-paper (? tanglefoot) in order to subdue the plague of flies and to get some idea of its course. Altogether 49,426 fly-papers were used, and 4,359,658 house-flies and 282,202 stable-flies were caught. The number of house-flies caught in dwellings and in pig-sties was about the same—about half the numbers caught in byres and in stables. The stable-flies preferred byres, but were caught in dwellings within 200 metres of byres and cattle markets. The increase both of house-flies and of stable-flies in February, 1916, after an unusually warm December and January is taken as evidence that they can hatch out (*ausgeschlüpft sein konnen*) during winter. The plague of house-flies ran from April to October, with a maximum in August; that of stable-flies from June to November and December, with a maximum in September. Low temperatures seemed to retard development more in the stable-fly than the house-fly, though the adult stable-fly seems less sensitive to cold; the author thinks that *Empusa muscae* must have something to do with the earlier disappearance of the house-fly.

There is nothing very novel out of these laborious investigations.

A. A.

NOC. **Rôle des mouches en pathologie intestinale. Prophylaxie.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. Dec. Vol. 2. No. 10. pp. 280–283.

The author remarks that in the course of the year 1920 epidemics of bacillary and amoebic dysentery occurred at Senegal in synchrony with an unusual multiplication of flies, although amoeba cysts were not found in some flies captured at the hospital.

A. A.

KOBAYASHI (Harujiro). **On the Further Notes of the Overwintering of House Flies.**—*Japan Med. World.* 1922. July 15. Vol. 2. No. 7. pp. 193–196.

Ordinary house-flies (*Musca domestica*) captured in autumn in Seoul (Korea), placed in tubes, and fed on moist biscuit, lived more than five months, the temperature of the room being between 5° and 15° C. The flies were active, and some of them dropped their eggs. Males often lived as long as females. Other house-frequenting flies treated the same way at the same time died soon, except *Fannia canicularis*, which lived up to 106 days.

The author obtained no positive evidence of the hibernation of larvae or pupae of *Musca domestica.*

Other species that hibernate as adults in Seoul are *Muscina stabulans*, particularly the female; *Fannia canicularis* and *scalaris* (also in the pupa stage); *Calliphora lata* (may also breed in winter); Mesembrina sp., especially the female; *Scatophaga stercoraria*, and several species of Anthomyids.

Species that hibernate only as pupae in Seoul are Lucilia sp., Sarcophaga sp. and *Stomoxys calcitrans*.

Ophyra nigra hibernates in Seoul in the larva and pupa stages.

A. A.

AUSTEN (E. E.). **The Prey of the Yellow Dung-Fly,** *Scatophaga stercoraria*, **L.**—*Ann. & Mag. Nat. Hist.* 1921. July. Ser. 9. Vol. 8. No. 43. pp. 118–123.

In a preface to a paper by G. S. COTTERELL on the life-history and habits of this fly, published in the *Proc. Zool. Soc.* for December, 1920, LEFROY states that it is "a constant and general feeder on the common species of blow-fly in England throughout the season" and hopes that its services may be turned to practical use as a check on the blow-fly. It appears, however, that LEFROY's generalization was based on observations of flies in traps, where the captured dung-flies fed upon the captured blow-flies—a case of Hobson's choice.

Austen, without asserting any special predilection for the yellow dung-fly, claims the possession of ordinary powers of observation, and is so disquieted by the thought that in the course of upwards of thirty years he has never observed a blow-fly among dung-flies' victims in nature, that he here brings other observers—to wit KIRBY and SPENCE, POULTON, A. H. HAMM, J. E. COLLIN, Colonel YERBURY, and Mr. COTTERELL himself—on to the platform to reassure him. Some of these authorities can specify the small flies that have been seen on the field in the dung-fly's grasp; few of them have seen, most of them have never seen, a blow-fly among these victims. On these and other grounds the proposal to employ the dung-fly in the domestic service of man must be dismissed as illusive.

A. A.

BEZZI (M.). **On the Dipterous Genera** *Passeromyia* **and** *Ornithomusca*, **with Notes and Bibliography on the Non-Pupiparous Myiodaria Parasitic on Birds.**—*Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 29–46.

The strange fly *Carnus hemapterus*, which sucks the blood of nestling birds and passes its larval stages in the nests, was described by NITZSCH more than a century ago. FALCOZ (Contribution à l'étude de la Faune des Microcavernes: Faune des terrier et des nids. Lyon) has drawn attention to the number of dipterous larvae found in bird-nests. The present paper, to which a comprehensive bibliography is attached, deals with several genera of flies—*not* belonging to the well-known pupiparous group—that are parasitic on birds, namely Passeromyia and Protacalliphora, which belong to the Calliphorine subfamily of the Muscidae; Philornis and Chortophila, which are referred to the Anthomyidae; and the Acalyptrate Muscids, Carnus and Neottiophilum.

Passeromyia is widely distributed in the warm zones of the Old World; its larvae are found in the nests of Passerine birds and suck the blood of the nestlings. Two species are here distinguished and correlated.

Protocalliphora occurs in Europe and North America (also Hawaii); the larvae have the same habits as those of Passeromyia. Three species are here systematically discussed. Of certain species, not here included, the larvae are said to be subcutaneous parasites of birds.

Philornis is Neotropical: the larvae are subcutaneous parasites of birds. Three species are here dealt with.

In the case of Carnus it is the adult fly that sucks blood while the larva lives in the bird's nest and is saprophagous. The adult fly has caducous wings (like the pupiparous Lipoptena). The only species known is European.

Of the two species of Chortophila one is European, the other North American; the larvae are found in bird-nests and probably live on the excrement.

One species of Neottiophilum is known, but only from Central Europe; "almost nothing is known about the larva," but living puparia have been found in nests of Passerine birds.

A. A.

MARZINOWSKY (E. J.). **[A New Species of Phlebotomus in Russia,** *Phlebotomus caucasicus* **sp. nov.]**—*Medicinskoye Obozreniye* (*Med. Review*). Moscow. Vol. 87. No. 13–16. 3 pp. With 2 plates.

The author describes a sand-fly caught by him in Tiflis (Trans-Caucasia) which he claims to be a new species—*Phlebotomus caucasicus*. It appears to be closely allied to *P. sergenti* recently described by PARROT from Algiers, but differs from it in the structure of the antennae, the genital apparatus and other minor features.

C. A. Hoare.

DAWE (M. T.). **Efwatakala Grass** (*Melinis minutiflora*) **as a Means for the Control of the Tsetse-Fly.**—*Tropical Life.* 1922. May. 8 pp. With 1 fig.

Efwatakala grass (*Melinis minutiflora*) is widely distributed in Africa, from south of Sahara to Natal; it is also cultivated extensively in South America as pasture, being known in Brazil as *gordura* (= fat grass) and *capim mellado* (= honey grass). *Eftwatakala* is its name in the Congo language, but in other parts of the Congo country it is known variously as *lekamboma, sala, ngonosch tutubia.*

This grass has a strong odour, and its leaves are covered with glandular hairs containing a viscid oil. In Portuguese Congo it is used for repelling fleas from sitting hens and littering dogs; and in other parts for stopping fermentation in palm-wine. In Brazil and Colombia it is believed that ticks cannot live in *gordura* pastures, and that Dermatobia is disappearing before it. For all these reasons the author thinks that it should be cultivated as a defence against tsetse-flies and mosquitoes. It grows in moist lowlands as well as on dry hill tops. If the bush were cleared and planted with this grass the grass would hold its own, for in the coffee plantations of Brazil "capim mellado is often sown in order to stifle certain weeds; so thickly does it mat on the surface that the most stubborn of them is ousted."

The author does not seem to have made any experiments on his own account.

A. A.

JOURNAL OF THE DEPARTMENT OF AGRICULTURE. Union of S. Africa. Pretoria. 1922. Apr. Vol. 4. No. 4. pp. 303–304.—**Tsetse Fly Studies.**

Records the discovery, in Zululand, by Mr. R. H. HARRIS, of breeding grounds of *Glossina pallidipes*; all were in dry, sandy loam, rich in humus, near drinking-places, associated (in every case but one) with a low bush called *umkukuti* in the vernacular, and not in heavy forest; pupae were never found under logs, or about roots or trunks of trees.

From some small experiments of his own Mr. HARRIS has faith in burning, not in any hope of destroying pupae, but to deprive the fly of necessary shade. The burning would have to be repeated for some years. He also approves of reducing the amount of game.

A. A.

FERRIS (G. F.) & COLE (F. R.). **A Contribution to the Knowledge of the** *Hippoboscidae* **(Diptera Pupipara).**—*Parasitology.* 1922. June. Vol. 14. No. 2. pp. 178–205. With 20 text figs.

The authors' observations have been made on specimens prepared by a method which, though not generally in favour with entomologists, is well known to give most instructive results, namely, clearing and then mounting in balsam, after having first softened the specimen in 10 per cent. KHO solution and then cleaned and washed and dehydrated it. [For small Diptera, fixed in alcohol, softening with KHO is not necessary, of course.]

The paper is distinguished by its ingenious and magnificently-executed figures.

A. A.

PATTON (W. S.). **Some Notes on Indian Calliphorinae. Part VI. How to recognize the Indian Myiasis-producing Flies and their Larvae, together with Some Notes on how to Breed them and Study their Habits. VII. Additional Cases of** *Chrysomyia bezziana* **Vill., together with Some Notes on the Diptera which cause Myiasis in Man and Animals.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 635–653. With 10 figs. & 2 plates. pp. 654–682.

In this paper the author continues his account of the species responsible for myiasis in man and domestic animals. The first part of the paper deals once more with *Chrysomyia bezziana*, a species previously known only from tropical Africa as a pest of animals, but which the author has discovered to be extremely common in India and considers to be, in its larval stage, a true parasite of man also, always laying its eggs (when it selects man) in sores or discharges, or at some of the natural orifices of the body—urinary meatus possibly excepted—when these happen to be in an "attractive" condition. ROVERE, in Africa, observed it laying its eggs on the intact skin of cattle, but the author does not approve of this as a normal habit. RILEY, in India, states that he grew the larvae on decomposing meat, but the author doubts the statement. The author here gives brief abstracts of 35 more cases of human myiasis and 61 more of myiasis in animals due to the maggots of this species, the cases being from all parts of India. In the human cases the maggots (or pupae) were found in ulcers and sores of various kinds in various parts of the body, also in the mouth, nose, ear, orbit, and vagina. The author has never observed the adult fly in bazaars or in houses, and thinks that it must feed on flowers.

In the second part of the paper the species causing myiasis are catalogued as (1) "Specific Myiasis-producing Flies," or flies like the Oestridae, *Chrysomyia bezziana*, and others, that deposit their eggs only in living tissues, so that in the larval stage they are true parasites; (2) "Semi-specific Myiasis-producing Flies," or species that normally lay their eggs in garbage of various kinds but occasionally in wounds, etc., so that in the larval stage individuals may sometimes be fortuitously parasitic; and (3) "Accidental Myiasis-producing Flies," or species of which the eggs or larvae may be swallowed accidentally in food or drink and the larvae may subsequently make themselves at home in the human intestine. In the account of the Oestridae a fatal case of infestation with *Cobboldia elephantis* is mentioned where the maggots were so numerous in the stomach of a young elephant that, in the words of the observer, "there was no room for a pin to pass through the stomach." The paper concludes with some remarks on the prevention and control of the flies under discussion. Here the author lays great stress on a popular application of technical education.

A. A.

PATTON (W. S.). **Notes on the Calliphorinae. Part I. The Oriental Species.**—*Bull. Entom. Res.* 1922. May. Vol. 13. Pt. 1. pp. 109–113.

This paper, besides dealing critically with the synonymy, contains valuable summaries of the distribution, habits, and breeding preferences of Oriental Calliphorines; six species of Chrysomyia, five of Lucilia, and one Calliphora are included in the catalogue.

A. A.

TOOMEY (Noxon). **Hypodermiasis (Ox-Warble Disease).**—*Brit. Jl. Dermat. & Syph.* 1922. Feb. Vol. 34. No. 2. (No. 400.) pp. 31–42. With 8 text figs.

The aim of this paper is to emphasize the difference between the skin-lesions caused by larvae of the warble-fly, Hypoderma—three species of which, namely *H. bovis* (W. Europe, Canada, and northern United States), *H. lineata* (United States), and *H. diana* (S.E. Europe) are known to attack men—and those caused by larvae of the bot-fly, Gastrophilus. In the case of Hypoderma there are subacute outbreaks of inflammation of the *subcutaneous* connective tissue at the point of entry and along the course taken by the larva in its wanderings, and finally when the larva comes to rest there is the warble or indolent boil—indistinguishable from an ordinary boil except for the central breath-hole and the sensation of *ballotement*—commencing in the corium and spreading to the epidermis.

A. A.

GREIG (David M.). **Myiasis oestrosa: being the Occurrence in the Human Subject of the Larva of** ***Hypoderma bovis.*** **A Vindication of Edinburgh's Priority of Recognition.**—*Edinburgh Med. Jl.* 1922. June. New Series. Vol. 28. No. 6. pp. 258–266.

The author in recording a case of cutaneous myiasis in a child, due to *Hypoderma bovis*, refers to some other cases of the same sort, and claims that the first three on record were reported in 1848 to the University of Edinburgh by Dr. G. W. SPENCE, of Lerwick, who stated that they occurred in 1818 in the practice of his father in the same place.

A. A.

PATTON (W. S.). **Notes on Some Indian Aphiochaetae.** *Aphiochaeta xanthina,* **Speiser** (*repicta,* **Schmitz;** *circumsetosa,* **de Meijere;** *ferruginea,* **Brunetti), whose Larvae cause Cutaneous and Intestinal Myiasis in Man and Animals, and** *Aphiochaeta rufipes,* **Meigen, whose Larvae occasionally cause Cutaneous Myiasis in Animals.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 683–691. With 1 plate.

The egg, full-grown larva, pupa and adults of *Apiochaeta xanthina* Speiser (= *ferruginea,* Brunetti) and *A. rufipes* are here described and figured. The former has long been known as of accidental occurrence in the intestine of man ; the author has bred it from faeces of animals, and from decaying meat, and has also encountered it in sores, etc. ; he gives short abstracts of its occurrence in two cases of ulceration in man and three in cattle, and also of the occurrence of *A. rufipes* in sores in cattle in two cases.

A. xanthina bred artificially in tubes lived, the males not more than a week, the females about a month. Females laid from 218 to 344 eggs. The eggs hatched in 28–36 hours. The developmental term, from egg to adult stage, occupied from 21–27 days.

A. A.

INGRAM (A.). *Aphiochaeta xanthina,* **Speiser** (*A. ferruginea,* **Brun.) as an Intestinal Parasite in the Gold Coast.**—*Jl. Trop. Med. & Hyg.* 1922. May 1. Vol. 25. No. 9. pp. 113–115.

Apiochaeta xanthina, Speiser (= *ferruginea,* Brunetti) has been recorded from West Africa, but not—until the present case—as an intestinal parasite of man there. A specimen of faeces containing puparia was left in five per cent. formalin overnight, and in the morning the pupae, being found to be alive, were removed, washed, and dried, with the result that in due time the flies issued unharmed. Some of the flies were confined along with a piece of raw meat, and next day eggs were found ; the next day after, larvae were seen ; five days after that, pupation had begun, and the following day all had pupated ; finally, on the fifteenth day after the first appearance of the eggs, five adult flies hatched out. It was observed that pupae could not withstand desiccation.

The patient from whom the faeces containing the original puparia came was badly anasarcous, had eggs of *Bilharzia* in her urine, and eggs of *Ascaris lumbricoides* in her faeces, and ultimately she died, so that it is hard to judge what part—if any—*Apiochaeta xanthina* had contributed to her condition. In another case of infestation by this fly, reported by the same observer, Dr. G. E. H. LE FANU, the patient did not show any symptoms suggestive of beriberi.

A. A.

PATTON (W. S.). **Note on the Occurrence of the Larvae of** *Philaematomyia crassirostris,* **Stein, in the Human Intestine.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 57–59.

Philaematomyia crassirostris, a bloodsucking Muscid fly, has been carefully studied by Patton and CRAGG, who have never known it to lay its eggs in anything but fresh cow dung ; but, as the author points out, the occurrence of its larvae in the intestine of a Hindu patient is not altogether surprising if it be remembered that in the Hindu ceremony of purification the five products of the cow—one of which is the animal's dung—are mixed and eaten.

The patient in the present case is stated to have been passing threadworms for eight years and dipterous larvae for six, and he was also heavily infected with *Ancylostoma duodenale*. He received two courses of thymol for the last, and was cured, but he still continued to pass dipterous larvae. Successive specimens containing these larvae have been examined by the author, who has specifically identified them, not merely by inspection, but by securing the pupal and adult stages. One specimen sent to the author also contained an egg of the species as well as two larvae of a Sarcophaga.

A. A.

LOUGHNAN (W. F. M.). **Notes on a Case of Myiasis.**—*Jl. Roy. Army Med. Corps.* 1922. June. Vol. 38. No. 6. p. 458.

A case of infestation with larvae of Dermatobia, which occurred at Belize in British Honduras in the practice of a local doctor. A tobacco leaf gummed over the inflamed sites stopped the pain immediately, and when the leaf was removed eight hours afterwards the larva could be squeezed out.

A. A.

GABRIELIDES (A.) & GUIART (J.). **Myiase oculaire à** *Oestrus ovis* **à Constantinople.**—*Paris Méd.* 1922. Mar. Vol. 12. No. 12. pp. 249–250. With 2 text figs.

In this case the patient came for treatment eight hours after, as he thought, a foreign body had got into his eye. There had been slight and transitory pain which had returned about five hours afterwards. On examination several small larvae were seen crawling on the conjunctiva. These were removed under 4 per cent. novocaine, the action of which they resisted for 20 minutes. The larvae, 14 in number, were identified as *Oestrus ovis* of the first stage.

A. A.

DARTIGOLLES (R.). **Un cas de Myiase nasale en Guinée.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. p. 416.

The maggots, which proved to be *Pycnosoma* (*Chrysomyia*) *putorium*, were lodged under the right cheek, and were observed in muco-purulent fluid escaping from the nose. They were washed out first with boiled water, then with menthol water, and finally with iodine water.

A. A.

PATTON (W. S.). **Notes on Two Cases of Cutaneous Myiasis caused by the Larvae of** *Sarcophaga* **sp.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 60–62. With 1 text fig.

These two cases occurred in the Jubilee Hospital, Nellore, Madras Presidency. In both cases the larvae of species of Sarcophaga were removed from abscesses, and in one case it is believed that the larvae were deposited in the abscess after it had been opened.

A. A.

DA MATTA (Alfredo). **Perturbaçoes mentaes produzidas por naso-buco myiase com perfuração do veu do paladar.** [Mental Disturbance produced by Naso-Buccal Myiasis with Perforation of the Velum palati.]—*Brazil-Medico.* 1921. Oct. 15. Year 35. Vol. 2. No. 14. pp. 195–197.

The patient, a day labourer aged 28, came under treatment complaining of a feeling of weight in the head, mental confusion and periodical attacks of intolerable pain. The attacks were accompanied by prostration and vertigo and there was throughout intense mental irritability. Other symptoms noticed were coryza, itching of the nasal fossae, slight epistaxis, hoarseness and a burning sensation in the throat. Temperature 102° F. The patient's condition grew steadily worse in spite of local and constitutional treatment. On the fourth day after admission a nurse drew the author's attention to a larva which he had found on the patient's lips. A careful examination was made of the mouth and nasal fossae and a similar larva was found on the tongue. They appeared to have issued from a small orifice on the soft palate. During the next two days three more orifices appeared on the palate and from them issued 17 larvae. All symptoms rapidly disappeared and the patient was discharged well on the 17th day. The larvae were identified as those of *Chrysomyia macellaria*, F. The patient was in the habit of falling asleep under trees during his mid-day rest and it was probably on one of these occasions that the fly laid its eggs in the nostril. The author refers to an article on the subject by W. de ALMEIDA, of Rio—" Mental Disturbance in the Course of Nasal Myiasis " (*Arch. Brasileiros de Med.*, 1917, No. 4).

F. S. Arnold.

PATTON (W. S.). **Note on the Egg-laying Habits of** *Cobboldia elephantis*, **Cobbold.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 63–65. With 1 text fig.

The author understands from good authority that the Indian elephant-bot, *Cobboldia elephantis*, may sometimes cause the death of its host. He has received third-stage larvae taken from the stomach of an elephant calf, in which they were so packed as not to leave room for a pin to pass. As in the case of *Cobboldia loxodontis* of the African elephant, observed by RODHAIN and BEQUAERT, the eggs of *Cobboldia elephantis* are laid in packets at the base of the tusks, and the larvae on hatching are believed to find their way to the stomach through the mouth. The author found that when an egg-packet was placed in water, as might happen when an elephant is drinking (or in salivation), the eggs split and the larvae emerged with remarkable activity. Observers are requested to pay attention to the bot-flies of the Indian elephant, as their habits are not sufficiently known and their larvae are obviously a serious pest of the elephant.

A. A.

SENIOR-WHITE (R. A.) & SEN (S. K.). **Further Notes on the Occurrence of Coleoptera in the Human Intestine.**—*Report of Proc. of 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 236–239.

The object of this note is to draw the attention of medical men to the subject in order that exact observations may be made and recorded as opportunity occurs.

A. A.

EZICKSON (William J.). **A Case of Larvae in the Male Urethra.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 22. Vol. 78. No. 16. p. 1201.

Several small larvae were squeezed from the urethra of a male patient who complained of intense local itching. The larvae could not be identified, and " the mode of implantation and the species of larva remain a mystery."

A. A.

DELANOË (P.). **Le mouton piège à puces.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 416–418.

The best trap for fleas, according to the author, is a living sheep. The fleece of the sheep with its natural grease suffocates fleas as effectually as a bath of oil.

A. A.

KENYA COLONY. **Report on the Identification of Fleas collected by Mr. W. N. van Someren in Kenya Colony [Kavirondo District] during Plague Survey, and submitted to the Director, Imperial Bureau of Entomology, by Mr. T. J. Anderson, Government Entomologist. I. 1922.** [MS. received from Colonial Office.]

Echidnophaga gallinacea, on rat and domestic fowls. *Dermatophilus penetrans*, from native huts. *Xenopsylla brasiliensis*, on *Rattus* (*Mastomys*) *coucha ugandae*.

A. A.

RILEY (William A.). **The Reputed Vesicating Properties of the Granary Weevil,** *Calendra granaria*.—*New Orleans Med. & Surg. Jl.* 1922. Apr. Vol. 74. No. 10. pp. 678–682.

One of the author's graduate students, Miss Florence DEFIEL, has proved, by careful experiments, that the weevil, *Calandra granaria*, does not possess the vesicating properties that have been attributed to it. The author also himself partook of a dose of more than half a gramme of the powdered weevil, on an empty stomach, without any ill-effects.

A. A.

DEFIEL (Florence). **An Experimental Investigation of the Supposed Poisonous Qualities of the Granary Weevil,** *Calendra granaria*.—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 199–211.

From varied experiments on rodents, chickens, frogs, and on the human skin, the author " considers it justifiable to conclude that the granary weevil contains no cantharidin and cannot be used as a substitute for the blister-beetle, nor is there any evidence to indicate that it is responsible for cases of poisonous flour." As the author points out, these conclusions, though not congruent with often-repeated uncritical statements, are in agreement with those published by HENRY and BONASTRE in 1827. A list of 29 pertinent references to the subject is given.

A. A.

BEQUAERT (J.). **A propos des Staphylinides vésicants du Bas-Congo.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 227–229.

The Staphylinid beetle described by RODHAIN and HOUSSIAN as causing a vesiculous dermatitis in Congo has been identified as *Paederus sabaeus*, a species distributed all over the Ethiopian zoogeographical region. The genus *Paederus*, which is cosmopolitan in range, is very numerous in species, and many, if not all of them, have vesicant properties. The following species are notorious in this respect: in Africa, *P. sabaeus* and *P. crebripunctatus*; in Asia (Java), *P. peregrinus*; in S. America, *P. amazonicus*, *P. columbinus* and *P. goeldii*; in S. Russia (Astrakhan), *P. fuscipes*. Two other European species, *P. limnophilus* and *P. gemellus*, have been shown experimentally to be blister beetles.

A. A.

LOIR (A.) & LEGANGNEUX (H.). **Accidents de travail occasionnés par des coléoptères.**—*Bull. Acad. Méd.* 1922. July 18. 3rd Ser. Vol. 88. No. 29. pp. 68–72.

Labourers employed in discharging an offensive cargo of bones suffered severely from itching of the skin, vesiculous conjunctivitis, irritation of the respiratory tract, and nausea.

The symptoms were found to be caused by the larvae of Dermestes, which were present in such enormous numbers that their hairs filled the air with a fine powder on the slightest movement.

A. A.

FOOT (Nathan Chandler). **Pathology of the Dermatitis caused by** *Megalopyge opercularis*, **a Texan Caterpillar.**—*Jl. Experim. Med.* 1922. May 1. Vol. 35. No. 5. pp. 737–753. With 2 plates.

Megalopyge opercularis, the slug-like but hairy larva of which is known in Texas as the puss-caterpillar, opossum bug, Italian asp, and by Mexicans as *el perrito*, causes by its hairs a painful, burning, vesicular dermatitis, sometimes also extensive swelling, and numbness; in the case of children there may, in addition, be fever, restlessness or mild spasms, nausea and vomiting. The hairs [like those of some African species of Anaphe] are hollow and have a bulbous base or poison-sack.

The hairs of the larva of *M. opercularis* and the tubercles to which they are attached are described and figured; they contain a venom which appears to be stored in the bulb. The toxin is destroyed by boiling; its virulence decreases when the caterpillar has spun its cocoon, and is lost after death.

A list of families and genera of moths of which the hairy or spiny caterpillars have stinging effects is also given. It does not profess to be complete. The families mentioned are the Megalopygidae, the Cochlidiidae (= Limacodidae), of which the caterpillars also are slug-like and hairy, the Thaumatopoeidae (= Eupterotidae), to which the processionary-caterpillars belong, the Lasiocampidae (eggar and lappet-moths), the Liparidae (= Lymantriidae, browntail and gypsy-moth family), the Arctiidae (tiger-moth family with "woolly-bear" caterpillars), the Saturniidae and Hemileucidae (tusser-silk moth families).

A. A.

KNIGHT (Harry H.). **Observations on the Poisonous Nature of the White-Marked Tussock-Moth** (*Hemerocampa leucostigma* **Smith and Abbot**).—*Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 133–135.

The author and some friends have had vivid experience of the irritant effects of the hairs of the cocoons (and the dorsal tufts of the larva) of the Liparid moth, *Hemerocampa* (= *Orgyia*) *leucostigma*—namely, itching and burning within a few minutes of contact, followed by swelling which continued painful for several hours, and succeeded, after subsidence of swelling and pain, by red spots lasting to the third day. In the case of the person who collected the cocoons, there was some fever. There is some ground for supposing that the venom may not be developed until the larva is nearly full grown ; a half-grown larva "failed to react as did seven or eight mature caterpillars."

A. A.

HASHIMOTO (T.) & HAGIWARA (H.). **Ueber den giftigen Nachtschmetterling (*Euproctis frava* Bremmer) und die dadurch verursachte Dermatitis.** [In Japanese. German Summary, pp. 51–52.]—*Japan. Ztschr. f. Dermat. u. Urol.* 1922. June. Vol. 22. No. 6. pp. 475–491. With 6 text figs.

Acute dermatitis caused by the scales of the moth *Euproctis frava* occurs in epidemics in Japan. The author did not succeed in any method of extracting a poison, and agrees that the irritation is caused mechanically.

A. A.

i. RODHAIN (J.). **La subsistance de l'*Ornithodorus Moubata* sur des reptiles et des sauriens.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 560–564.

ii. ——. **L'ubiquisme parasitaire de l'*Ornithodorus Moubata* peut-il influer sur son infection par le spirochète de Dutton?**—*Ibid.* pp. 564–565.

i. The experiments here recorded show that the nymphs of *Ornithodorus moubata* can live quite as well on the blood of a viper (Causus) or a true lizard (Gerrhosaurus and Hemidactylus) as on that of a mammal, but that the blood of the chameleon is difficult for them to digest, toxic, and often fatal. Young ticks of this species, however, die in greater numbers when given successive feeds on the viper than when fed on a mammal (guinea-pig or rat). Though the blood of the chameleon is indigestible and toxic at a first feed, it seems possible that those ticks that survive a first feed can subsequently become habituated to chameleon blood.

ii. An *Ornithodorus moubata* habituated from its earliest nymph stage to chameleon blood was not thereby precluded from becoming infected and infective when finally fed upon a mouse having *Spirochaeta duttoni* in its blood.

A. A.

CUNLIFFE (Norman). **Some Observations on the Biology and Structure of *Ornithodorus savignyi*, Andouin.**—*Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 17–26. With 3 text figs.

This is a companion paper to one by the same author [see this *Bulletin*, Vol. 19, p. 492] on *O. moubata*.

Under laboratory conditions the biology is much the same in both species. The changes in external anatomy undergone during development are similar to those already described for *O. moubata*. Reproduction was inhibited at 37°C. Moisture is unfavourable at every stage of growth. Parthenogenesis does not occur. A female may produce over 400 eggs, of which at least 60 per cent. may be fertile.

A. A.

DELANOË (P.). **Au sujet d'*Ornithodorus marocanus*, Velu, 1919.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 418–420.

Ornithodorus marocanus, Velu, has been found by the author in Doukala and Oualidia (Cape Blanc) in pig-styes and in moist, sandy soil beneath fallen palm-leaves. Its bite may be fatal to young pigs, but does not seem to do much harm to man, since a shepherd, who in one night received so many bites that he resembled a case of haemorrhagic smallpox, suffered nothing more than attacks of malaise for 24 to 36 hours and intolerable itching for a few days.

A. A.

BRUMPT (E.) & LARROUSSE (F.). **Transmission de la Piroplasmose canine française par le** *Dermacentor venustus*.—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 540–545. With 1 text fig.

Transmission of canine piroplasmosis was demonstrated by LAUNSBURY, in Africa, for *Haemaphysalis leachi*; then by CHRISTOPHERS, in India, and by BRUMPT, in Tunisia, for *Rhipicephalus sanguineus*; then by BRUMPT for *Dermacentor reticulatus*: the present paper contains an account of its experimental transmission by means of *Dermacentor venustus*. In this, as in all the other species named, the infection acquired by the adult tick is transmitted to the next generation, but becomes evident only when that generation becomes adult. The transmission through the intervening larva and nymph stage is not affected, even when the larva and nymph are fed on animals refractory to the infection.

A. A.

PUSA. **Report of the Proceedings of the Fourth Entomological Meeting held at Pusa, 7th to 12th February, 1921.** [Edited by FLETCHER (T. Bainbrigge).]—pp. xii + 401. With 57 plates. 1921. Calcutta: Supt. Govt. Printing, India. [Price Rs. 7 As. 8.]

The meetings of which the proceedings are here set forth were attended by 41 entomologists, and among the visitors who participated was Professor POULTON, of Oxford. Fifty-one papers of varied interest were read and discussed, and 50 of them are now published in this report: nine of them come into the medical and veterinary purview and have already been noticed in the *Bulletins* of this Bureau. But besides the papers of a purely economic and technical import there are several that treat of things of general interest, like life-history and bionomy; these, together with the chairman's opening address, which contains some lively touches of humour, supply salt and savour to the plainer entomological fare.

No apology is necessary for drawing attention to the chairman's (Mr. Bainbrigge Fletcher) special contribution, entitled "Koenig's Paper on South Indian Termites." This paper, published in 1779, "has remained in oblivion all too long," and general thanks are due to Mr. Fletcher for having translated it and republished it here.

A. A.

Patton (W. S.). **Note on the Value of a Tame Cow for collecting the Blood-sucking Diptera of a Locality.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 66–68.

The author, in India, has been accustomed to use now a tame cow, now a tame bull, for attracting blood-sucking flies. The animal must be docile or it will object to being flicked with a net or prodded with a test-tube.

A. A.

de Mello (Froilano) & Correa Afonso (P.). **First Entomological Records in Portuguese India.**—Reprinted from *Report of the Proc. of the Fourth Entom. Meeting held at Pusa, 1921.* pp. 43–48.

This paper contains a list of such insects of economic importance as have been identified up to the present in Portuguese India—chiefly insects predacious and parasitic on man, but also a few pests of growing crops and of stored grain. The authors began to make observations on this important subject six years ago, but they complain that their labours have not hitherto received a very warm official acknowledgment.

A. A.

Louis (D. J.). **Black Spider Poisoning. Report of Four Cases.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 8. Vol. 76. No. 2. p. 99. [Received Oct. 17, 1922.]

The bite of the Mexican " black spider " (black with a few white spots on the body) causes immediately a pustular eruption, which is followed by much oedema and spreading lymphangitis and lymphadenitis. In addition to severe pain there is nausea, vomiting, restlessness, and slight fever. The disabling consequences of the bite may last from four to ten days. Magnesium sulphate, locally and internally, is recommended as the basis of treatment.

A. A.

Vlok (A. M.). **Fatal Case of a Scorpion Bite.**—*S. African Med. Rec.* 1922. Sept. 23. Vol. 20. No. 18. pp. 354–355.

Records the death of " a strapping lad " of eighteen, and of his dog, following stings from a single scorpion. The youth was seen about seven hours after the accident; there were two punctures on his forefinger, he was in a clammy sweat, complained of a feeling of suffocation, and had difficulty of breathing and great difficulty in swallowing; he was quite conscious, and did not complain of pain. Coarse moist sounds were heard all over the chest, the heart sounds were very weak, and the pulse was soft and bounding. Some viscid blood-stained mucus was coughed up. After treatment with hot-water applications and a hypodermic injection of strychnine the patient felt better, but some hours later he collapsed and died. The dog was found dead about 200 yards from the scene of the accident. The scorpion was not seen by anybody but the youth himself, who made the ambiguous statement that it was suspended from his forefinger by its two " claws "; the state of collapse in which he was first seen by the author was said to have followed five minutes after the scorpion's attack.

A. A.

KRAUS (R.). **Estudos sobre os venenos das glandulas das cobras opisthoglyphas e aglyphas Brazilieras.** [Studies on the Poison Glands of Brazilian Cobras.]—*Brazil Medico.* 1922. June 3. Year 36. Vol. 1. No. 22. pp. 283–285.

This article, which is spoken of as a first communication, is divided into two parts; (1) The venom of Brazilian Opisthoglypha; (2) The toxicity of certain glands of the Aglypha.

Attention is first directed to two previous publications from the "Instituto de Butantan," the one by Dr. de C. PENTEADO on a histological study of the glands of certain species of Opisthoglypha, Aglypha, and a constrictor [see this *Bulletin*, Vol. 17, p. 128], the second by Dr. Ñaur MARTINS on the venom of Brazilian Opisthoglypha, especially *Philodryas schotti* and *Erythrolampus aesculapius*. The article under review comprises the results of a further study of the latter question.

In the first series of experiments the venom was extracted by trituration of the fresh gland with normal saline and subsequent centrifugation. Thus obtained it is a viscid, milky fluid with a powerful proteolytic action, markedly coagulant but weakly haemolytic. Injected intravenously into pigeons and rabbits it acts on the central nervous system, producing paralysis with convulsions. 0·5–1 cc. killed the animals in a few minutes, 0·25 cc. in a few hours. 1 cc. intraperitoneally caused death in a guinea-pig in a few hours and, subcutaneously, in 24 hours with local necrosis. Blood taken from the heart after death remained fluid in vitro. The venom retained its activity after drying for several months; that of *Philodryas schotti* was destroyed by a temperature of 70° C. An antivenene was obtained but it neutralized only two lethal doses of the venom.

For the second series of experiments the glands (of *Drymobius bifossatus*) were emulsified in saline and the extract filtered and centrifuged. 0·3 cc. injected intravenously killed pigeons in 5 minutes and rabbits (500 gm. weight) in 10 minutes; intramuscularly, 0·5 cc. caused death in the former in 40 minutes, in each case with paralysis and respiratory embarrassment. The action of the venom was not destroyed by heating to 80° C. When dried, 5 mgm. caused death in a rabbit in 22 minutes [method of administration not stated].

All the above results were produced with extract of the superior labial gland; that from the rostral gland proved negative. The blood of animals killed by this venom coagulated readily. An antiserum prepared against this proved ineffectual even against two lethal doses.

The author concludes by saying that a division of Colubrids into venomous and non-venomous species is without scientific foundation since they all possess poison glands with toxic secretions and that they play a part in normal digestion.

H. Harold Scott.

CROLEY (V. St. John). **Cobra Bite.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 951.

——. **Notes on a Case of Recovery from the Bite of a Cobra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 57–60.

The report of this instructive case is best given in the author's own words. It may, however, be doubted whether a tourniquet applied to the forearm was of much effect.

" A young Anglo-Indian employee of the Bengal-Nagpur Railway had recently captured a female cobra (*Naia tripudians*) 4 ft. 6 in. long, and on May 24th, 1921, was exhibiting it to some friends of his, when it suddenly bit him twice on the dorsal surface of his right wrist, at about 8.45 a.m. A string and handkerchief were tied tightly above the bite, and he was brought to hospital, where he was seen about 9 a.m. A rubber tourniquet was applied tightly round the forearm, and gold chloride was injected subcutaneously around the bites after they had been incised. The patient was placed in bed in hospital and two injections of antivenene, 20 c. cm. each, were administered under the skin of the abdominal wall. He was suffering agony from the constriction of the ligature and tourniquet, and the arm was getting considerably swollen. The ligatures were removed about 10 a.m., much to his relief, and I warned the nurse on duty to let me know as soon as he presented any untoward symptom. At 10.55 a.m. it was reported that he was restless and said he could not see. On examination I found that he had complete ptosis of both eyelids, he was bringing up a considerable amount of sticky saliva and mucus from his mouth, and his speech was becoming slurred. I immediately ordered antivenene to be injected intravenously, and this was done at once, 60 c. cm. being injected. From now on symptoms of paralysis developed with great rapidity. The sticky mucus increased greatly, and he vomited up bile and mucus twice ; he then lost all power of speech and of swallowing, and had severe spasms. He was quite conscious all the time, and was very distressed by the constant flow of sticky mucus, which had to be swabbed out of the back of the pharynx very frequently. He lost control of his sphincter ani, and had three copious watery evacuations within an interval of ten minutes. I ordered continuous oxygen inhalation at 11.30 a.m. as the respirations had become very shallow and sighing, interrupted every few minutes by a severe spasm, during which the back became arched, after one of which respiration stopped altogether. The patient was lifted to the floor, and I had to do artificial respiration for about a quarter of an hour before the respiratory movements recommenced and became in any way regular. Once this was re-established he seemed to turn the corner. From this time (12.45 p.m.) onwards the symptom that troubled the patient most was the flow of sticky mucus ; he had no more spasms. I saw him again about 2 p.m., when the respirations were still regular, but the pulse, which had been 80 to the minute, had gone up to 120, and later rose to 132. He complained by signs of great thirst, so I gave him ice to suck, which relieved him a little, but he still could not swallow water. I ordered atropine sulphate gr. 1/100 at 4.15 p.m. with the hope that it would not only stimulate the respiratory centre but also diminish the secretions. It came up to my expectations ; the secretions perceptibly diminished, and the respiratory movements became deeper. The patient now started to talk again, although the speech was very slurred, and I began to hope that he would pull through. At 8 p.m. the pulse became slower, although his temperature had gone up to 102° F. At 10 p.m. he was still restless, and I ordered that another atropine injection should be given if he had any respiratory trouble. At 10.30 p.m. he complained of a severe pain over his heart and had dyspnoea, and atropine gr. 1/100 was again injected. This had an immediate beneficial effect ; he slept for forty minutes, and from then onwards he did not look back. He slept off and on during the night, and by 7 a.m. on May 25th the only paralytic symptom noticeable was ptosis, which finally disappeared by 10 a.m. His only complaint now was the arm, which was very inflamed and swollen, and was sloughing where the gold chloride was injected. The sloughs subsequently came away, and afterwards a skin graft was applied ; the patient was discharged from the hospital without any contraction."

There is a small doubt that, as the author says, the patient received a lethal amount of venom and was saved by the treatment adopted. The author considers that the atropine, as a stimulant of the respiratory centre, contributed to the success of the treatment.

A. A.

SULDEY (E. W.). **Le parasitisme intestinal au Gabon.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 574–576.

Having examined several hundred Pahouins, the author thinks a statement of their intestinal parasites would be interesting, although he had no intention of determining their parasitic index.

In 81 per cent. of those examined intestinal worms were found, in the following proportions :—*Necator americanus* in 60 per cent., *Ascaris lumbricoides* in 51 per cent., *Trichocephalus trichiurus* in 36 per cent., *Oxyuris vermicularis* in 3 per cent., and *Strongyloides stercoralis* in 2 per cent. Mixed infestations of two, three, or four species were common enough.

Flagellate Protozoa—*Trichomonas intestinalis, Tetramitus mesnili,* and Cercomonas—occurred in 16 per cent. of those examined.

More than 15 cases of dysentery, acute or chronic, were observed. *Entamoeba " dysenteriae "* was found in the stools, but cysts were rare. *Endolimax nana* was found three times and Iodamoeba twice.

Almost all the Pahouins had microfilaria—usually perstans, more rarely bancrofti—in the blood ; perstans was sometimes seen in great abundance in the blood-streaked mucus of non-amoebic dysentery cases. *Necator americanus* also sometimes caused intestinal haemorrhages.

A. A.

REICHENOW (Eduard). **[Parasitos de la sangre y del intestino de los monos antropomorfos africanos.]**—*Bol. Real. Soc. Espanola de Hist. Nat.* 1917. Vol. 17. No. 5. pp. 312–332. With 2 plates. [Summarized in *Bull. Inst. Pasteur.* 1922. May 15. Vol. 20. No. 9. pp. 374-375.]

A paper dealing with parasites observed by the author in chimpanzees and gorillas, namely a Microfilaria which he identifies with *M. perstans,* and a trypanosome which he regards as a variety—*primatum*—of *T. lewisi*. The latter was observed also in the Lemurine Perodicticus, and in *Cercopithecus cephus* ; in chronic infections its flagellum is short or wanting.

A. A.

AUSTEN (E. E.). **Note on a Small Collection of Indian Tabanidae and Other Blood-sucking Diptera, Formed by Captain H. E. Cross, I.C.V.D., Sohawa, Jhelum District, Punjaub, and Received for Examination from the Royal Society of Tropical Medicine & Hygiene.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Feb. 16. Vol. 15. No. 8. p. 264.

AUSTEN (E. E.). **Further Notes on the Tabanidae of Palestine, with Descriptions of New Species.**—*Bull. Entom. Res.* 1922. Aug. Vol. 13. Pt. 2. pp. 151–160. With 4 text figs.

The descriptions include a new species each of Chrysops and Tabanus.

BISHOPP (F. C.). **Insects in Relation to the Health of Man.**—*Texas State Jl. Med.* 1922. Aug. Vol. 18. No. 4. pp. 215–217.

An interesting survey of the subject.

BRUG (S. L.) & DE ROOK (H.). *Bironella gracilis,* **Theobald 1905.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 133–137. With 1 plate.

LYNCH (Kenneth M.). **A Note on Certain Coprozoic Organisms in Cultures from Man.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 223–224. With 8 text figs.

An uncritical note.

MACFIE (J. W. S.) & INGRAM (A.). **On the Genital Armature of the Female Mosquito.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 157–188. With 23 text figs.

A descriptive account of the female genitalia of 50 West African species of mosquitoes.

MAHULETE (J.). **Een en ander over enkele Anophelinen van het eiland Ceram.** [On Some Anophelines from the Island Ceram, Moluccas, D.E.I.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 138–145. With 2 text figs.

DE MELLO (Froilano), NUNES (Joaquim Pinto) & RIBEIRO (Josina Lima). **Morphologie et cycle évolutif de deux Bodonides.**—*C.R. Soc. Biol.* 1922. July 22. Vol. 87. No. 27. pp. 699–701.

Describes a complete mitosis in the multiplication of a free-living Bodo and also of *Bodo muris*.

PATTON (W. S.). **New Indian Species of the Genus** *Musca*.—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 69–77.

Descriptions of five new species of Musca from India.

SWELLENGREBEL (N. H.). **Twee, voor Nederlandsch-Indië, nieuwe Anophelinen.**—*Nederl. Tijdschr. v. Geneesk.* 1922. Apr. 15. Vol. 66. 1st half. No. 15. pp. 1535–1536.

Anopheles brevipalpis, Roper, and *A. punctulatus*, Dönitz.

WALCH (E.). **Au sujet de la structure des oocystes des Plasmodies du paludisme.**—*C.R. du 4ième Congrès de la " Far Eastern Assoc. of Trop. Med."*—9 pp. With 6 plates. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

JUNGLE CLEARING IN MALAYA.

With reference to a statement published in " Recent Progress in Medical Zoology " (this *Bulletin*, Vol. 18, p. 2) that Malcolm WATSON had shown " how by indiscriminate clearing of jungle innocent or not very harmful species of Anopheles may be eradicated only to open up a way for some extremely dangerous species," Professor C. STRICKLAND writes to say that the actual discovery of this important principle was made by him, after several years of patient investigation, and not by Malcolm WATSON. He supports his claim (1) with a copy of an article by WATSON, reprinted from the *Malay Mail* of November 27, 1915, in which the discovery is attributed in terms of high admiration to STRICKLAND, and (2) by a reference to a paper of his own on this discovery, which was communicated to this Bureau along with a reprint of the article by WATSON, and was reviewed, with full appreciation of STRICKLAND's observations and conclusions, in this *Bulletin* (Vol. 7, pp. 262–263).

I much regret to have done a specific injustice to Professor STRICKLAND, and I can only say, in extenuation, that in the article on " Recent Progress " the discovery undoubtedly made by him was not being discussed in itself, but was merely used as an illustration of the need for the study of the oecology of the several species of Anopheles. On the subject of oecology the name of Malcolm WATSON, as a leading authority, who had already noticed the existence of the special problem solved by STRICKLAND and had already expressed the thought that its solution would be an oecological one, came first in my mind.

If, in emphasizing the original thought and attitude of WATSON, rather than the original discovery made by STRICKLAND in 1915, I have appeared to be oblivious of the merit of STRICKLAND's work, I regret to think that I must have appeared equally oblivious of the work of PRATT, who observed in 1907 that streams in ravines near Kuala Lumpur were free from Anopheles larvae where the jungle was intact, but were infested with larvae where the jungle had been cleared, and of WELLINGTON who in 1909 confirmed this observation; and equally oblivious of the perspicacious conclusions of FLETCHER, who in 1908 pointed out the danger of clearing the jungle from such streams unless at the same time they are trained and cemented or bricked. I hope that these gentlemen, as well as Dr. STRICKLAND, will accept this expression of my regret.

A. Alcock.

MALARIA.

ARCHIVES DES INSTITUTS PASTEUR DE L'AFRIQUE DU NORD. 1922. June. Vol. 2. No. 2. pp. 157–164. With 1 plate. (i) **Hommage à A. Laveran** (p. 157).

LAVERAN (A.). (ii) **Note sur un nouveau parasite trouvé dans le sang de plusieurs malades atteints de fièvre palustre** (Acad. de Méd., séance du 23 novembre 1880). (p. 157.) (iii) **Deuxième note relative à un nouveau parasite trouvé dans le sang des malades atteints de la fièvre palustre** (Acad. de Méd., séance du 28 décembre 1880). (p. 158). (iv) **Troisième note relative aux éléments parasitaires trouvés dans le sang des malades atteints d'impaludisme** (Acad. de Méd., séance du 25 octobre 1881). (p. 160.) (v) **De la nature parasitaire des accidents de l'impaludisme** (C.R. Acad. Sci., séance du 24 octobre 1881). (p. 160.)

The recent death of LAVERAN prompts the reprinting of the original notices of his discovery of a parasite in the erythrocytes and blood of malaria cases, while working on November 6, 1880, at the Military Hospital, Constantine. The first communication to the Academie de Médécine announced the presence of crescents ; of rounded, pigmented, sometimes tentacled bodies somewhat smaller than an erythrocyte, and of larger rounded bodies which were held to be doubtless derived from the former ones by imbibition of serum. Of the second communication Léon COLIN, who communicated it, says but little except to insist that these bodies will have to be clearly differentiated from leucocytes. The third communication announces the presence in water of pigmented bodies resembling those present in malarial blood.

In the *Comptes Rendus de l'Academie des Sciences* of October 24, 1881, these parasitic elements were carefully described. It was noted that, mixed with a weak solution of quinine, they died. They were found in 148 out of 192 malarial cases examined, most of those who were negative having had quinine. It was noted too that in those dying of malaria these pigmented elements were present in the blood and vessels of the spleen, liver, medulla and brain, and that the bodies which crammed the capillaries to the point of obstruction were clearly derived from the parasites which had died with their host. LAVERAN's conclusions were the following :—" Les accidents de l'impaludisme sont produits par l'introduction dans le sang d'éléments parasitaires qui se présentent sous les différents aspects décrits ci-dessus; c'est parce qu'il tue ces parasites que le sulfate de quinine fait disparaître les accidents de l'impaludisme."

Recent reviews of MANSON's life work have made clear his appreciation of the functions of these detached tentacles, a matter on which LAVERAN could hazard no opinion.

Clayton Lane.

LEGER (André). **Le paludisme à Dakar en milieu indigène. Documents hématologiques, index endémique, faune anophélienne, étude prophylactique.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. June. Vol. 1. No. 2. pp. 3–5.

An experience of three years of Dakar and the examination of blood from 240 children leads to the conclusion that during the wet season beginning in July the percentage of infection with *Plasmodium praecox, P. malariae* and *P. vivax* is respectively 91, 7 and 2, while the corresponding percentages for the dry season, beginning in December, are

48, 29 and 23. Of the indigenous Anophelines *Anopheles costalis* constitutes 80 per cent., *Anopheles funestus* and *pharoensis* being also present. The actual definitive host for the region has not apparently been determined. Malaria is considered the main mortality factor. The splenic index is viewed with distrust. The recommendations comprise the detection and thorough quininization of every infected person, the destruction of all breeding-places in and about Dakar, mechanical screening, and the spread of knowledge in schools. The heavy financial burden involved in the carrying out of this programme is held to be balanced by a great economy in the human factor.

C. L.

LEGER (Marcel) & BAURY (A.). **Index du paludisme à Dakar en saison fraîche.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 510–514.

SANTARELLI (P.). **Note sur le paludisme à Dakar.**—*Ibid.* pp. 515–516.

i. In the middle of the cool season 1921–22 blood examination of 366 children from Dakar and the adjacent Medina, the last rain having fallen during the previous September, showed malarial parasites in 42·3 per cent. Of the infections 67 per cent. were with *Plasmodium falciparum*, 6 per cent. with *P. vivax* and 27 per cent with *P. malariae*. In general, infection diminished with age. Gametocytes, either alone or associated with schizonts, were found in nearly 7 per cent. of malignant tertian, in nearly 78 per cent. of benign tertian, and in over 98 per cent. of quartan infections. *Plasmodium malariae* was found in a child of 20 days old, which, as the writer notes, somewhat indecently hurries the transformation of forms, if the unity theorists are to be followed. Of 214 cases from Medina only 14 per cent. had an enlarged spleen, while the parasite rate was 50 per cent., a fact the more significant in that about half of those with enlarged spleen showed no parasites in the blood.

ii. The effect upon the naval personnel of residence in this malarial focus is described. In the years 1919, 1920 and 1921 the percentage of malaria among Europeans was respectively 176, 150 and 73, and of first attacks 64, 54 and 19 respectively. The improvement occurred thanks to antilarval measures and prophylactic quinine. The time is anticipated when a reduced anopheline population will produce an equivalent reduction in malarial incidence.

C. L.

LEGER & BAURY (A.). **Recherches sur l'Index endémique du paludisme en Guinée.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 497–499.

Investigations were carried out in the beginning of February, the height of the dry season, at Conakry and Kindia. Of 35 children examined at Conakry, the splenic index was 14·3, the parasitic 60. About Kindia, of 96 examined the indices were 7·3 and 45·7 respectively. In the main, infection lessened as age increased. There were 27 cases of infestation with *Plasmodium praecox*, 4 of them with gametocytes; the corresponding figures for *P. malariae* were 38 and 18; *Plasmodium vivax* was absent. In only 6 out of the 12 splenomegaly cases were parasites detected in the peripheral blood. At this season Anophelines were extremely rare, indeed only one, an *Anopheles costalis*, was detected.

C. L.

PALESTINE. **Report on Malaria in the Egyptian Expeditionary Force, 1918.** [ANGUS (W.), Lt.-Col., R.A.M.C., A.D.M.S., Sanitation, E.E.F.]—46 pp. With charts & maps. 1919. [MS. Report.]

A report upon malaria in the Egyptian Expeditionary Force during 1918 from Lt.-Col. W. Angus, A.D.M.S., Sanitation, E.E.F., to the Director of Medical Services, E.E.F., has been furnished by Dr. MANSON-BAHR to the Tropical Diseases Bureau. It was circulated locally. Its value justifies wider publicity.

The military situation in the spring of 1918 demanded that the army in Palestine should stand fast all summer, in a belt of country where indigenous malarial infection reached 25 per cent., the figure in non-residents being 60. This decision was reached with the full knowledge, supplied by the medical staff, that it was a challenge to nature. The report recounts the manner in which the sanitary and medical personnel enabled this challenge to be carried to a successful termination. The line fell into three zones: the coastal plain; the stony Judean hills, 2,000 feet high, with deep intersecting valleys; the Jordan valley, 8–10 miles wide and 1,200 feet below sea level. In the coastal plain Anophelines bred in marshes, streams and irrigation channels; in the Judean hills in a network of mountain streams; in the Jordan valley in wadis, irrigation channels, swamps and backwaters; and everywhere in hundreds of wells and cisterns.

The Anopheles were:—*A. bifurcatus*, breeding all the year round in covered cisterns and wells; *A. palestinensis*, in clear water near springs and rivulets, breeding becoming active about April on the coast, May in the hills and March in the Jordan valley; *A. maculipennis*, round Muleblis in wells and irrigation channels, and in the Jordan valley in pools and backwaters. Less frequently found were *A. turkhudi*, common in the Jordan valley wadis; *A. pseudopictus*, in coastal marshes and sluggish water; and *A. fragilis*.

This stupendous problem the medical staff attacked thus. Each unit was required to furnish its antimalarial squad. For large works these were supplemented by corresponding detachments of infantry, Royal Engineers, by Indian Pioneer Regiments, which did their usual magnificent work, and by the Egyptian Labour Corps. Instances of the work done comprise the emptying of one marsh by pumping its water over a ridge into the sea, the draining of another by the opening up of a tunnel through the ridge which dammed it; the banks of the Auja, to mention one river only, were cleared, for its whole length of 12,000 yards, of vegetation of tropical luxuriance, and the whole canalized; its tributaries being similarly treated. Irrigation channels and wells formed a problem apparently simple but, from the apathy or active interference of the inhabitants, difficult. The effects of the oiling of wells and cisterns is of great interest. Opposed by the "Politicals" as likely to upset the inhabitants, it was nevertheless tried in two villages (after full explanations to the headmen of its reasons and effects, and after their inhabitants had been warned to draw off sufficient water to last them for 4 or 5 days) in the proportion of from 1/3 to 1 ounce of paraffin per square yard of surface. A few inhabitants protested against the unpleasant taste, most did not. The oil was found to entangle and destroy the adults as well as to kill the larvae, so that a very marked diminution in the flying insects occurred. As a significant sequel the inhabitants requested a month later, since mosquitoes were again becoming a nuisance, that the oiling should be repeated, and the process was made obligatory throughout the XX Corps area. The effect on malarial incidence in troops and inhabitants was striking, and in one instance where malaria persisted, the discovery that inadequate surveying had resulted in the treatment of only half the wells and cisterns justified the conclusion that the facts stood as cause and effect. By such means even the pestiferous Jordan valley became less vile in its effects.

Excellent mosquito nets were issued but improperly used, so that it is questionable whether they were worth their cost. Repellents appear to have been of doubtful value. Prophylactic quinine, 5 gr. of the sulphate or hydrochloride daily, issued to two squadrons resulted in a malaria rate of 3·4 per cent., that of controls being 10·7. On the other hand 15 gr. of quinine biweekly among the German and Austrian personnel in Palestine, gave a malarial percentage of 60, no other antimalarial measures being taken. Sulphur, 15 gr. daily, appeared ineffective. General administration of prophylactic quinine was not ordered.

Diagnosis was by six malaria diagnosis units initiated, trained and supervised by MANSON-BAHR, who also gave lectures on malaria, a new disease to many, to the personnel of the Field Ambulance of each Corps. A great deal of pressure from headquarters was required to get these Diagnosis Units utilized. Even when operations began one of them was left behind as a useless incumbrance. They examined 40,168 slides, of which 21·1 per cent. showed benign tertian, 6·5 per cent. malignant tertian, infestations. There were recognized 126 cases of mixed and 9 of quartan infection, and in 361 instances the organism of relapsing fever. The two military laboratories and the Anzac Laboratory examined another 71,093 slides. In treatment the point most stressed was the importance of giving quinine intramuscularly or intravenously in malignant infections.

With the advance in mid-September, the height of the malarial season, all effective prophylaxis of necessity ceased, and all attempts to attain the ineffective was deliberately set aside. "It was hoped that the latent period between infection and the onset of sickness would be long enough to enable the attack to be pushed home successfully before sickness caused any appreciable diminution in the fighting strength of the troops. And so it happened." But with not too much to spare. A battery, and a company of sappers, are instanced as having been temporarily wiped out by malaria, almost to a man, when they reached Damascus. And the same sort of thing occurred throughout the force. Moreover, had it not been for the diagnostic work carried out by the Malaria Diagnosis Units, the results might have been far graver than they were. For example, 11 out of 15 patients isolated in an ambulance as dysenteries were found to be cases of malignant malaria; and of 48 slides taken in one morning from men diagnosed as influenza, 30 showed the subtertian parasite. It cannot be doubted that these mobile units, undergoing if necessary binary fission with the orderly in charge of one half, saved many valuable lives.

C. L.

SDRODOWSKI (P.) & LINDTROP (G.). **Malaria im Gebiet von Lenkoran-Mughan bei Aserbeidshan.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 8. pp. 225-231. With 1 map in text.

In this part of the Western Caucasian Shore the splenic index between July and September, 1921, varied from 50 to 80·9, reaching

100 in certain restricted areas. The percentage in which parasites were detected in the 2,000 cases examined varied from 33·2 to 63·1. Among the infected the proportions in which the different plasmodia were found differed from region to region; *Plasmodium vivax* from 9·7 to 66·1, *P. falciparum* from 9 to 78·7 and *P. malariae* from 11·6 to 69·7 per cent. of the total infections. Anopheles were unusually numerous, and since, in the previous year, breeding places are held to have entirely disappeared from the steppes on account of the drought, it is concluded that they migrated "by continuity" from the nearest swamps, 10–30 kilometres away. The accepted age of infested persons varied from infancy to 100 years, the age of highest infection lay between 2 and 3 years. Natives show tolerance to infestation, the percentage of carriers among them being 13, two-thirds of them infected with quartan malaria.

C. L.

JAARVERSLAG DER MALARIACOMMISSIE VOOR NOORD-HOLLAND OVER 1921. [Report on the North Holland Malaria Commission for 1921.] [ALDERSHOFF (H.), Chairman; KORTEWEG (P. C.), Secretary.]—Reprinted from *Verslagen en Meded. Betreffende de Volksgezondheid.* 1922. 26 pp. With 1 folding map & 3 figs.

The work for 1920 was abstracted in this *Bulletin*, Vol. 19, p. 282. The dates of appearance of larvae and of males of *Anopheles maculipennis* during 1921 were April 29 and May 1. Sprinkling ponds with creolin to the extent of 30–40 gm. per M. was destructive of all animal life; yet 4 weeks later this was abundantly present. The method is inapplicable where such destruction is not desired, or where the water is drunk. As a means of destruction of the mosquitoes themselves nothing was found equal to 3 per cent. lysol. With a view to establishing the optimum habitat of the imagines 23,322 places were examined during the year. Pig-sties and stables were most densely populated; byres were less favoured, on account of the dampness of the ceilings. Absence of air-movement characterized the most used habitats; nevertheless none were found in rabbit burrows or in the Naarden fortifications. Apart from a few cases of quartan, whose origin was doubtful, all were of benign tertian malaria. The percentage of clinical malaria in certain practices worked out at 8–10 as against 9–16 in the previous year. The percentage of infected mosquitoes was 6 in December, reaching, however, 13 in one lot of 200. Screening with gauze of 11 meshes to the centimetre is strongly advocated, detailed instruction for its arrangement being given. The whole report bears the imprint of thorough work.

C. L.

NEVEU-LEMAIRE. **Les grandes endémo-épidémies intercoloniales. Le paludisme.**—*Presse Méd.* 1922. Aug. 23. Vol. 30. No. 67. pp. 1397–1403. With 3 maps in text.

The history of discovery of the malarial parasites and their life-history are outlined, and a general survey is made of the incidence of malaria in all the French Colonies. In view of the very definite morphological and biological characters of the three species of malaria parasites Neveu-Lemaire is unable to understand those who have revived the question of specific unity of the three forms.

C. L.

WALCH (E.) & WALCH-SORGDRAGER (G. B.). **Een Epidemie van malaria perniciosa en tertiana, in hoofdzaak overgebracht door** *M. sinensis.* [An Epidemic of Subtertian and Tertian Malaria, principally transmitted by *M. sinensis.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 164–182. With 3 plates.

A full description is given by the authors of the malarial epidemic, the first part of which they reported before [this *Bulletin*, Vol. 19, p. 286]. Though *A. ludlowi* played an important part at certain times of this epidemic, throughout its whole course *A. sinensis* remained the principal carrier. The authors themselves give the following summary of this interesting account (abbreviated) :—

1. The malarial epidemic, prevalent at Sungei Tuan from the end of 1919 till the beginning of 1921 and substantially consisting of subtertian cases, had a mild character.
2. This may have been caused by the fact that *sinensis* was the principal carrier. *A. ludlowi* and *kochi* played a far less important part. Perhaps the larvae of *sinensis* under favourable circumstances have expelled those of the other species.
3. Not only the infection index but also the absolute number of infected mosquitoes is important in the causation of an epidemic.
4. The total number of cysts counted in the infected mosquitoes was higher in *ludlowi* than in *sinensis* ; notwithstanding the total number of infected *sinensis* was two and a half times that of the infected *ludlowi.*
5. In the cysts in *kochi* only coarse pigment was seen ; all sorts of pigment in *sinensis* and *ludlowi.*
6. A general quinine cure administered twice had a pronounced effect. Tertian was more resistant than subtertian, partly on account of its greater inclination to relapses, partly because tertian is better transmitted by *sinensis* than subtertian.
7. The effect of the separate measures taken against this epidemic is difficult to judge. Intensive catching of the mosquitoes in the later months is considered to have exerted an important preventive influence.
8. The use of buffalo stables as mosquito traps did not have the good results reported elsewhere.

W. J. Bais.

GODOY (A.) & PINTO (C.). [**Estudos sobre Malaria.**]—*A Folha Medica.* Rio de Janeiro. 1922. Apr. 30. Vol. 3. No. 8. p. 87. [Summarized in *Rev. Applied Entom.* 1922. Sept. Vol. 10. Ser. B. Pt. 9. p. 175.]

"In the District of Campos, State of Rio de Janeiro, *Anopheles* (*Cellia*) *brasiliensis* is the most common Anopheline, the other species there being *A.* (*C.*) *argyritarsis*, *A.* (*C.*) *albimanus* and *A.* (*C.*) *tarsimaculatus.* Microscopic examination showed *A. brasiliensis* to be infected with malaria, though the authors are not satisfied as to the value to be attached to such examinations of the stomachs of Anophelines."

C. L.

REGNAULT (Félix). **A propos du paludisme.**—*Presse Méd.* 1922. Oct. 4. Vol. 30. No. 79. pp. 1654–1655.

Among the accessory causes of malaria stress is laid upon the vicious circle induced by the apathy of the infected. They are too enervated to initiate the necessary hygiene. Wealth, too, with its accompanying good nutrition, its avoidance of over fatigue, and its elimination of the single room home, where one infested member infects the whole family, has its evident effects. So far few will hesitate to follow him. It is otherwise with his third factor. That cattle should exercise a protective influence by providing Anopheles with food more likeable than does man is not unreasonable. But now appears again the story of the gun and the armour. Just as ROUBAUD claims that cattle-feeding Anopheles have jaws more powerfully equipped than do man-eaters, evidently adapted for piercing the stout bovine skin, so do the tanners tell Regnault that the cattle of the rich are refined and delicate skinned, those of the poor are bucolic [" rustique "], with skin thick and tough. The bovine armour has won the day in Macedonia, and the mosquito has to put up with man.

C. L.

GRASSI (B.). **Animali domestici e malaria. Nuovo orizzonte nella lotta antimalarica.** [Domestic Animals and Malaria.]—*Ann. d'Igiene.* 1922. June. Vol. 32. No. 6. pp. 421-512.

Various views regarding the influence of domestic animals upon malaria are considered; personal observations are recorded; the lessening of malaria in Europe during the nineteenth century is reviewed; and the following conclusions are reached. It is reasonable to assume that, in any locality, domestic animals will furnish anopheline provender, and so lessen the call on man. Animal stalls and pigsties furnish Anopheles with shelter which appeals to them, provided these are dark and airless, and the females find there the warmth suitable for the maturation of their malarial parasites. [It is presumably not intended to suggest any foolish devotion to a parasitic brood.] Anopheles correspond in number to their breeding places, but show a tendency to diffuse towards their food. Anopheles are perhaps not so much misanthropic and zoophilic as thermotropic. In malarial foci zoophilia shows itself strikingly and renders the spot free or nearly free of malaria, a conclusion which is clearly not in accord with general experience. The questions which still require to be answered are, Grassi considers, the following. Do Anopheles anywhere really have a preference for man or for animals ? ; and if for animals, for what animal ? Will an Anopheles which has bitten man confine its further feeds to man ? Will an infected Anopheles, when the infection has reached its salivary glands, seek again the site of its infection, or turn to some neighbouring refuge ?

C. L.

HOWARD (H. H.). **Malarial Relapses.**—*Southern Med. Jl.* 1922. May. Vol. 15. No. 5. pp. 343-347.

The argument unfolded in this paper centres largely upon the interpretation of the following table, which deals with the incidence of malaria in an area in Central Mississippi.

Infections are classed as " new " when the individual had had no malarial attack during the previous year, otherwise as relapses. Some difficulty occurs in interpreting the paper ; possibly the writer has in mind unpublished facts. His conclusion that mosquito control should decrease the ratio of new infections to old ones (should increase, that is, the ratio of relapses) is unlikely to be questioned. That control should, as is apparently suggested, increase the actual number of relapses is not obvious. The explanation given is that "by the terms of our classification the new infections of one season become apparent relapses of another season, if they develop a malarial attack." Surely this applies whether there be control or not. Again this occurs, "It is a significant fact that the incidence of malaria among the group classed as apparent relapses was very much higher each season than among any other group or all the remainder of the population of the areas." Clearly the table alone does not justify this statement.

Rates of Clinical Malaria for the Years 1918 *to* 1920, *inclusive.*

Year.	Location.	New Infections per cent.	Apparent Relapses per cent.	Totals.
1918	*Controlled Area.. ..	—	—	18·1
1918	*Non-Controlled Area ..	—	—	17·29
1919	Controlled Area.. ..	3·3	2·24	5·54
1919	Non-Controlled Area ..	6·5	3·7	10·2
1920	Controlled Area.. ..	1·94	3·08	5·02
1920	Non-Controlled Area ..	10·55	11·05	21·6

* No control measures were employed in 1918.

The second part of the paper is based upon nearly 16,000 cases collected from six different sources in literature; of which 56·5 per cent. are estimated by the original authorities as relapses. It is accordingly clear that a large percentage of malarial illness each year is due to relapse, and, as Howard urges, no amount of mosquito control can affect these cases. Accordingly the use of quinine for the sterilization of carriers is not only justified as an auxiliary measure, in all attempts to control malaria by antimosquito measures, but is essential if early and satisfactory results are to be obtained.

C. L.

SERGENT (Edm.). **Au sujet de l'expression "paludisme de première invasion."**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. p. 292.

Commenting upon BONAIN's criticism of certain terms used in connection with malaria [this *Bulletin,* Vol. 19, p. 291], Sergent points out that while the division of syphilis into primary, secondary and tertiary stages is excellent, that of malaria is unjustified; that the military term "paludisme de la première invasion" is useful and correct and corresponds to BONAIN's "paludisme de première atteinte," and that the terms "rechute" and "recidive" appear indispensable, the former signifying the recrudescence of an existing infection, the latter the appearance of a second infection in a subject which has been cured of a first.

C. L.

TRÉMOLIÈRES (F.) & CAUSSADE (L.). **Les complications cardiaques et aortiques du paludisme.**—*Rév. de Méd.* 1922. Vol. 39. No. 3. pp. 151–165.

Of 1,000 men invalided from Macedonia to France for malaria, 42 showed cardiac lesions ; of 34 of these malaria is " the only possible cause." The cases include 17 of functional disorder, such as praecordial pain, palpitation and tachycardia ; 9 with aortic lesions ; and 8 with myocarditis. In the other 8 cases malaria aggravated pre-existing cardiac lesions. The writers believe that they have thus ended a 100-year-old dispute. It has to be noted that this belief entails unquestioned acceptance of the medical history sheet's diagnosis of malaria, and of the position that all symptoms in a malarial subject are of malarial causation, even when, as in Macedonia, the malarial illness rate could be greater than the strength. A Wassermann test was made in all cases. In the only one in which the result is noted it was negative. Does this imply that in the others it was positive ?

C. L.

PAPASTRATIGAKIS (C.). **Contribution à l'étude du paludisme nerveux.**—*Rév. Neurologique.* 1922. Apr. Vol. 29. No. 4. pp. 394–401.

The nervous manifestations of chronic malaria are classed as meningeal, cerebral, medullary and neuritic. Apparently the test accepted as proving the malarial causation of these cases is the presence of a malarial parasite in the peripheral blood combined with the exclusion of other known causes. Except for an American quotation of date 1902, the references are all to papers in the French tongue.

C. L.

RIEUX (G.) & DELATER (G.). **Anémie et paludisme.**—*Rév. de Méd.* 1922. Year 39. No. 5. pp. 257–268.

Apart from anaemia of the ordinary type, which is fully considered, stress is laid upon the occasional presence in malaria of anaemia of the pernicious type. Two such cases are quoted from CODA. In both these cases malarial parasites were detected, and recovery followed quinine administration after the erythrocytes had fallen to 900,000 and 1,200,000 respectively [this *Bulletin*, Vol. 18, p. 333]. This paper adds a third case, a fatal one, in which there was infestation both with *Plasmodium falciparum* and a Taenia. No autopsy was possible. Anaemia of this type may be due, it is concluded, to cancer, fatness, syphilis, malaria, " bothriocephalus," ankylostomes and Taenia, and to unknown causes. It is accompanied by an aplasia of the intestinal mucosa, by achylia, and, possibly, by a primitive defect in the red marrow.

C. L.

CARDENAS SINCLAIR (Zenobio). **Frecuencia y tratamiento de las esplenomegalias palúdicas de los niños.** [Prevalence and Treatment of Malarial Splenomegaly in Children.]—*Crónica Méd.* 1922. Mar. Vol. 39. No. 705. pp. 94–98.

The value of this paper would have been enhanced had the statements made in different places harmonized.

The objects of the paper are to show, firstly, the prevalence of splenomegaly in children diagnosed as suffering from malaria, and, secondly, that the splenic enlargement is due to inadequate treatment with quinine.

One hundred and eighty patients are dealt with, of whom 105 lived in the city of Lima, on the banks of the river Rimác, and 75 in the suburbs. Of these there were 124 with enlarged spleens (68·8 per cent.).

In 83 of them blood examination revealed the presence of parasites: *P. vivax* in 58, *P. falciparum* in 22, and *P. malariae* in 3 instances.

In the blood of those with enlarged spleens it is stated that parasites were found in 67, and in the table the total is given as 67, but the figures are *P. vivax* 48, *P. falciparum* and *P. malariae* 16 each [total 80].

In the table giving the degrees of splenomegaly, there are records of 126 cases [not 124, as stated on three occasions]. There were 31 with the spleen extending a finger's-breadth below the costal margin, 48 to two fingers'-breadths, 20 to three, 20 to the level of the umbilicus and 7 to the level of the anterior superior iliac spine. As the result of treatment these enlargements disappeared in 5, 16, 22, 34 and 51 days respectively.

The treatment adopted was as follows:—An initial dose of sodium sulphate 10–25 gm. according to age; then for a week three doses daily of 50 cgm. of sulphate of quinine to children between 8 and 13 years of age, and 30 cgm. to those from 4 to 8 years. During the second week the dose was reduced to 30 and 20 cgm. respectively. After a week's interval the last-named doses were repeated, followed by another week's rest, and in the sixth week a single dose of 20 or 30 cgm., according to age, as before.

Should there still be enlargement of the spleen or cachexia, the course is prolonged.

H. Harold Scott.

MULHERIN (W. A.) & MULHERIN (F. X.). **A Few Observations on Malaria in Infancy.**—*Jl. Amer. Med. Assoc.* 1922. June 17. Vol. 78. No. 24. pp. 1873–1875.

Acute malaria in infancy differs, in the writers' experience, from that in adults in that it is constantly afebrile, that parasites cannot be found in 30 per cent. of cases, and that periodicity of symptoms and of parasitic development are absent. In 75 per cent. of cases vomiting occurs, in 25 per cent. diarrhoea, in 70 per cent. a palpable spleen. Regarding the standard treatment closely associated with BASS's name [this *Bulletin*, Vol. 18, p. 97], the writers hold that it sterilized 75, not 90, per cent. of cases, but do not believe that the thick film technique gives a positive diagnosis in more than 29 per cent. of clinically positive malarial cases. They accordingly deprecate the withholding of quinine where parasites are unfound, and advocate, somewhat quaintly, "scientific treatment plus brains as the best up-to-date treatment of malaria."

C. L.

OLINESCU (R.). **Le choc hémoclasique dans la malaria.**—*C.R. Soc. Biol.* 1922. July 22. Vol. 87. No. 27. pp. 751–752.

In 40 cases of malaria, 15 tertian, 9 quartan and 16 subtertian infections, without pigment or uribilin in the urine, perhaps with an occasional and temporary albuminuria, all having had quinine in most cases orally in a few severe ones subcutaneously, the following experiments were undertaken after about a week's apyrexia. The men fasted one evening. Still fasting, the blood pressure and leucocytic count were taken next morning. Each was then given 200 gm. of milk [this *Bulletin*, Vol. 14, p. 273] and the blood pressure and leucocytic count were again determined. If the leucocytic count had fallen by 2,000 the cases were considered positive; if by 1,000 with a fall in pressure of 20 mm., doubtful. Of the 40 men, 13 were positive, 6 doubtful, and 21 negative. The corresponding figures for the various infections were: benign tertian 4, 3 and 8; quartan 3, 2 and 4; subtertian 6, 1 and 9. Speaking generally the positive cases had been imperfectly treated for a previous malarial attack.

C. L.

SKLARZ (Ernest). **Häufung von Malariatodesfällen nach Salvarsaninjektionen.** [Deaths from Malaria after Salvarsan Injection.] —*Klin. Woch.* Berlin. 1922. July 8. Vol. 1. No. 28. pp. 1414–1415.

FRIEDEMANN (Ulrich). **Ueber die bedrohliche Ausbreitung der tropischen Malaria in der einheimischen Bevölkerung und ihre Beziehungen zum Salvarsan.** [The Threatened Extension of Tropical Malaria in the Home Population and its Relation to Salvarsan.] —*Ibid.* Aug. 12. Vol. 1. No. 33. pp. 1642–1648.

These communications add 13 to the cases of malaria appearing or reappearing after the administration of salvarsan. Of this number seven were sent to hospital as typhoid, the others as influenza, cerebral influenza, diarrhoea, perforated gastric ulcer, acute yellow atrophy of the liver, encephalitis after salvarsan. Four died, three of them undiagnosed during life, the fourth shortly after diagnosis. Blood examination and quinine saved the others. Two had been in Macedonia, one in Russia, five in France and four had never left Germany. The infection was in all cases with the subtertian parasite. It is urged that when any doubtful case occurs in Germany malaria should be considered, particularly if salvarsan have been administered.

C. L.

SARI (Emile). **Le paludisme, maladie professionelle, chez les marins pêcheurs.**—*Bull. Acad. Méd.* 1922. July 4. 3rd Ser. Vol. 88. No. 27. pp. 14–15.

Although employés in the customs, railways and telegraphs of Corsica have malaria included in the disabilities which may result from their work, this is not the case with fishermen. It is urged that sea-fishers should come under the Marine Office, for, although they are not infected upon the sea, their work compels them to land. Fishers on the marshes have no benevolent department to which ingenuity can attach them.

C. L.

EISENDRATH (B.). **De belangrijkheid van het bloedonderzoek in malariastreken.** [Importance of Blood Examination in Malaria Regions.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Apr. 23. Vol. 65. (1st Half-year.) No. 17. pp. 2268–2272.

The impossibility of establishing or excluding malaria without microscopic examination of the blood is insisted upon.

C. L.

SINTON (J. A.). **A Case of Malaria due to *Plasmodium tenue* (Stephens).**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 215–235. With 2 plates & 1 chart in text.

This paper is illustrated by 40 camera lucida drawings, and by 7 micro-photographs by Lt. Col. S. R. CHRISTOPHERS, and contains very detailed descriptions of the parasites found. The case described is one of five seen within a month, all apparently at the Central Jail, Nagpur, C.P., India, in which jail the patient had resided two years. The original case of *Plasmodium tenue* came from Singanama, 100 miles from Nagpur. The infection was severe, 1 erythrocyte in 12 being infested, yet the temperature only once exceeded 101° F. and fever disappeared without treatment. The tenue type of parasite was not persistent but occurred between the 26th and 32nd hours after segmentation, mainly on alternate days and most markedly at the edges and ends of smears. STEPHENS' *P. tenue*, it is concluded, is here dealt with; its characters are of specific value, provided that before such specificity is absolutely proven it will be necessary to re-examine *Plasmodium falciparum* to make quite certain that a tenue stage, hitherto undescribed, does not exist in the cycle of the parasite. Sinton finds striking resemblances between the forms he describes and *P. immaculatum*, Grassi & Feletti, 1907.

C. L.

HESNARD (A.). **Paludisme et psychoses constitutionnelles.**—*Arch. Méd. et Pharm. Nav.* 1922. July–Aug. Vol. 112. No. 4. pp. 287–293. With 2 charts in text.

Holding the view that in mental affections the constitution determines the symptomatic plan while some intercurrent cause, generally some infection, initiates the process, Hesnard considers malaria to have constituted such a factor in a Serbian non-commissioned officer.

This youth with a mental equipment easily exalted or depressed, and a brain packed by voracious and indiscriminate studies in all manner of directions, became infected with malaria on the Salonica Front and developed insanity characterized by maniacal excitement. He became the "Commandant of Europe," with conduct in unreasonable accord. The infection was with *Plasmodium falciparum*, and the symptoms and physical signs were as usual. Cured of his malaria he became, after nine months, depressed—miserable regarding the ridicule he felt he had brought upon himself by his recent behaviour. Complete bodily and mental cure followed. He was repatriated in 1918, since when an English Red Cross Society has twice reported his continued freedom from mental trouble.

C. L.

VILLA (Luigi). **Per la casistica clinica della malaria: meningismo in latenza.**—*Policlinico.* Sez. Prat. 1922. July 3. Vol. 29. No. 27. pp. 869–875.

The writer discusses at length two cases, each with a history of previous malaria, a meningeal condition, an enlarged spleen and a complete absence of malarial parasites from the peripheral blood.

C. L.

URECHIA (C. I.). **Paludisme chronique compliqué de crises confusionnelles transitoires et de polynévrites multiples.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 13. 38th Year. 3rd Ser. No. 24. pp. 1070–1073.

A man of 34, first infected with malaria at 18, had during 1913 a railway accident involving cerebral traumatism, unconsciousness, and psychic troubles which required a year for recovery. Taking to drink, he celebrated Christmas by running through the streets naked and obstreperous. Complete double ptosis followed, with intense trigeminal neuralgia, diplopia, loss of taste in the anterior two-thirds of the tongue, oedema about, and visibility of, the right temporal vessels. The Bordet-Wassermann reaction was negative even after provocative doses of neosalvarsan. There was a mononucleosis amounting to 28 per cent. The blood examination, after the administration of quinine, revealed no parasites. The diagnosis rests on clinical evidence and on the fact that recovery followed the administration of quinine.

C. L.

PRATSICAS (André). **Un cas de pleuresie et méningite spinale au cours d'une fièvre remitente palustre.**—*Grèce Méd.* 1922. July–Aug. Vol. 24. No. 7–8. pp. 35–36. With 1 fig. in text.

A man of 25, suffering since childhood from epilepsy and malaria (after being in hospital for nearly a month with pleuritic effusions, certain nervous symptoms, headache, and latterly with lapse into the typhoid state), had his blood examined. Parasites of subtertian malaria were found. Cure followed the exhibition of quinine, although contractures of the lower limbs persisted.

C. L.

GODILLON. **Sur un cas de rupture de la rate, d'origine paludéenne.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Jan.–Feb. Vol. 3. No. 11 12. pp. 11–12.

A man, constantly ailing from fever, easily fatigued, became ill one morning, vomited in the afternoon, apparently fell at some time, and died syncopic. Post-mortem the abdominal cavity contained a huge clot on its left side, a clot emanating from a rupture in the upper pole of a thin-capsuled spleen, which measured 25 by 10 cm. (10 by 4 in.). It is considered that the rupture was spontaneous and not traumatic.

C. L.

WOLLENBERG (Hans Werner). **Ein Fall von "endemischer" tropischer Malaria in Berlin.** [A Case of Endemic Subtertian Malaria in Berlin.] —*Deut. Med. Woch.* 1922. Aug. 4. Vol. 48. No. 31. p. 1042.

In a man who served during 1915 at Warsaw, where, so it is stated, only benign tertian malaria exists, and later at Arras, there occurred in December, 1921, a typical attack of subtertian malaria, microscopically established, while he was being treated in Berlin for syphilis with sodium salvarsan. His condition became grave with defective reaction to quinine, which, however, finally established a cure. The swarms of mosquitoes in Berlin in the summer of 1921, and the presence of numbers of infected troops there, make autochthonous infection possible.

C. L.

DUZÁR (Josef). **Ueber die Malaria im Säuglingsalter.** [Malaria in Infants.] —*Fortschritte der Med.* Berlin. 1922. Mar. 22. Vol. 40. No. 12. pp. 268–270.

Although from 1872 to 1881 there were seen at the Stephanie Children's Hospital, Budapest, 15 to 28 cases of malaria annually, no case presented itself there from 1901 to 1920. A child of eight months old infested by a malarial parasite, whose specific position it is impossible to allocate from the description, forms the basis of this paper.

C. L.

RAJA (R. N.). **Post-Mortem Examination in Cerebral Malaria. A New and Simple Method of Demonstrating Parasites in the Capillaries of the Brain.**—*Indian Med. Gaz.* 1922. Aug. Vol. 57. No. 8. pp. 298-299. With 1 plate.

" A piece of brain tissue from the cerebrum or cerebellum is pressed between two slides and the material thus obtained is transferred to a clean slide and spread out with the edge of another slide taking care to draw the spreader in only one direction. The smears are dried in the air or over a flame, fixed with alcohol or equal parts of alcohol and ether and stained by Giemsa's method or by diluted Leishman's stain; or they may be stained by the ordinary Leishman's method without preliminary fixation. Smears prepared in this way usually contain several portions of capillaries of varying lengths which, in cases of cerebral malaria, are filled with malarial parasites."

C. L.

BRAHMACHARI (U. N.). **Dangers of Rapid Intravenous Injection of Concentrated Solutions of Quinine Bihydrochlor.**—*Jl. Trop. Med. & Hyg.* 1922. July 1. Vol. 25. No. 13. pp. 209–211.

——. **Dangers of Rapid Intravenous Injection of Quinine Solution.**—*Lancet.* 1922. July 22. pp. 175–176.

Following the writer's practice, these two papers are identical except for a few inconsiderable verbal differences and the number of tables. In his opinion the amount of quinine injected intravenously should not exceed 1/120 gr. per second, or ½ gr. per minute. The injection of 10 gr. is accordingly spread over 20 minutes, the total quantity of fluid not exceeding 200 cc. Since the tables deal only with slow injections in weak dilutions, the writer's conclusions cannot be based upon them.

C. L.

MUKARJI (R. M.). **Intravenous Quinine in Malaria.**—*Indian Med. Gaz.* 1922. July. Vol. 57. No. 7. pp. 258–260.

Quinine intravenously in malaria is recommended as not so risky an operation as it is supposed to be. An experience of over 200 cases in which the bihydrochloride was injected, as many as seven times, in doses of 5–10 gr. dissolved in 20 cc. of sterile water induces the conclusion that the method is safe, and that larger dilution is unnecessary.

C. L.

RAYSON (H. Knights). **Muscle Necrosis.** [Correspondence.]—*Brit. Med. Jl.* 1922. Sept. 16. p. 533.

A warning as to the risk of muscle necrosis in intramuscular injection of quinine is accompanied by advocacy of the subcutaneous route. The advantages claimed for the subcutaneous over the oral route are: possibility of administration during vomiting, absorption into the blood, relief of muscular pains, quick and certain action, convalescence occurring with six to eight injections of from 5 to 10 gr. It is not suggested that they are equally advantages of the intramuscular route, with which the comparison should lie. That muscle necrosis must be absent if quinine be not injected into the muscle is obvious, but it is, nevertheless, admitted that local necrosis occurred in six out of some hundred cases. Presumably good fortune has avoided nerve necrosis in these cases, and cutaneous sloughing in a lady's arm.

C. L.

SILVESTRI (Silvestro). **La cinconina nella cura della malaria.** [Cinchonine in the Treatment of Malaria.]—*Policlinico.* Sez. Med. 1921. Dec. 1. Vol. 28. No. 12. pp. 529–545.

In the cases here detailed cinchonidine sulphate in doses of 1 to 2 gm. had no ill effects. It was as effective as, often more effective than, quinine in producing clinical cure. The courses were short, so that it would be unreasonable to blame the drug for the relapses which followed its discontinuation.

C. L.

AMANTEA (Fausto). **Il potere curativo della cinconina nella malaria.** [The Curative Power of Cinchonine in Malaria.]—*Policlinico.* Sez. Prat. 1922. Sept. 18. Vol. 29. No. 38. pp. 1231–1235.

Tried in 24 cases of tertian, subtertian, and quartan malaria, simple and clinically grave, in doses of 2 gm. daily this drug proved itself safe, rapid, efficacious, completely tolerated, and producing no disturbance of any kind. X-rays were used over the spleen in two instances. Tartar emetic was inefficacious with every kind of parasite at every stage of the disease.

C. L.

HOWARDS & SONS, Ltd. **The Price of Quinidine.** [Correspondence.]—*Indian Med. Gaz.* 1922. Sept. Vol. 57. No. 9. p. 358.

Howards & Sons, writing as the only British manufacturers of quinidine, point out, in answer to criticism by ACTON, that their prices of quinidine sulphate and other products have, since 1917, risen in price to an extent barely proportionate to the rise of price of quinine.

C. L.

KRAMER (P. H.). **Over malaria en over de behandeling der hardnekkige gevallen.** [On the Treatment of Persistent Cases of Malaria].—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 5. Year 65. (2nd Half-year.) No. 19. pp. 2289–2295.

In two cases of malignant tertian and in one case of benign tertian malaria the author obtained excellent results with the combined neosalvarsan and quinine treatment. In a third case of malignant tertian the good results were only very temporary. The treatment consists in giving three intravenous injections of 450 mgm. neo salvarsan at weekly intervals, irrespective of the temperature, and during the intervals 1 gm. of quinine in pills on three or four successive days.

T. Joekes.

NIEUWENHUYSE (A.). **Neosalvarsan en Malaria.** [Neosalvarsan in Malaria.]—*Nederl. Tijdschr. v. Geneesk.* 1921. June 18. Vol. 65. (1st Half-year.) No. 25. pp. 3349–3354.

In patients who cannot take quinine in any form Nieuwenhuyse tried the intravenous injection of neosalvarsan. In cases of benign tertian malaria the symptoms often subsided after a single dose, and no further parasites could be found in the blood. Occasionally, however, there is a relapse. In malignant tertian there is a temporary benefit; the anaemia improves and the parasites in the films stain with difficulty, their protoplasm showing signs of disintegration; relapses occur regularly. This treatment was tried without effect in one case of quartan.

T. J.

CONSEIL (E.) & GÉRARD (F.). **Essais de traitement du Paludisme par le "Trépol."**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 534–537. With 4 charts in text.

Trépol, a tartaro-bismuthate of potassium and sodium, given in injections of 2 to 3 cc. in 10 cases of malaria, microscopically established, some at least of them being infections with *Plasmodium falciparum*, produced inconstant therapeutic results—good, indifferent, and bad.

C. L.

SPAGNOLIO (Giuseppe). **Alcune modificazioni del sangue nei malarici trattati coi raggi x.** [Malarial Blood Changes in those treated by X-rays.]—*Giorn. di Clin. Med.* Parma. 1922. July 20. Vol. 3. No. 10. pp. 373–388.

Since both X-rays and quinine were used in the cases here described, and since controls were absent, the large amount of enthusiastic labour expended does not lead to firm conclusions.

C. L.

CASTELLI (A.). **Sulla divisione delle forme anulari dei parassiti malarici.** [The Fission of the Malarial Parasite.]—*Ann. d'Igiene.* 1922. Apr. Vol. 32. No. 4. pp. 259–263. With 1 plate.

In the blood of a child of two, erythrocytes were found, containing 2 to 4, some with as many as 8 to 10, rings, occasionally possessing falciform projections of protoplasm. In a few of the corpuscles the chromatin dots numbered 12 to 14. Gametocytes were round, semilunes being absent, which, taken with the appearance of the rings, induced a diagnosis of benign tertian malaria, the possibility of a double infection being ignored. It is considered that precocious multiplication of parasites is a more reasonable explanation of the facts than is multiple infection of erythrocytes. The bold style of drawing adopted, as, for example, in an absolutely bilaterally symmetrical heart-shaped body, does not render the easier the interpretation of the plate.

C. L.

KITAEFF (F.) & JOFF (I.). [In Russian. Abridged Version in French.] **De doubles infections d'érythrocytes et leur rapport à la parténogénèse des macrogamètes en cas de Malaria tertiana.**—*Rév. Microbiol. et Epidémiol.* Saratov. 1922. Vol. 1. No. 1. pp. 72–73. With 1 plate.

Commenting upon a case of benign tertian malaria with abundant parasites and with many double and multiple infections of individual erythrocytes with schizonts, with schizonts and gametocytes, and with gametocytes, the writers point out that in SCHAUDINN's own plates there is no morphological difference between the conditions he describes as double infections and as parthenogenesis of macrogametes. Their own infections include all combinations and gradations. Upon SCHAUDINN's hypothesis these observations would imply parthenogenesis of microgametes, and it is concluded that no proof of the parthenogenesis of macrogametes is in existence. [See this *Bulletin*, Vol. 11, p. 1.]

C. L.

HORNUS (Pierre. **Note sur les formes atypiques de** *Plasmodium praecox*.—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. June. Vol. 2. No. 2. pp. 227–229. With 12 text figs.

Yet two more instances are adduced of infection with *Plasmodium falciparum* in dying, untreated men in which typical are accompanied by atypical forms. The parasites were apt to take horse-shoe, comma, and other shapes, the chromatin and its surrounding vacuole to be divided and deformed, the central mass of pigment, round which segmentation occurs, to be solid. These unexpected forms are held to be part of the normal cycle in the haemopoietic organs, it being merely their thrusting into the open of the circulating blood which is abnormal.

C. L.

BINI (Guido). **Colorazione delle gocce spesse di sangue (thick films) per la ricerca dei parassiti malarici. II nota di tecnica microscopica.** [Thick Drop Staining of the Malarial Parasite. A Note on Technique.]—*Policlinico.* Sez. Prat. 1922. July 10. Vol. 29. No. 28. pp. 913–914.

The writer recommends the following technique for thick drop staining as superior to his own (*Malariologica*, 1920, Nos. 4, 5, 6) or that of SCHILLING (Jena, 1920, Gustav Fischer).

Upon a thoroughly cleaned slide three or four drops of blood are spread over a circle with a diameter of one or two soldi and dried in the horizontal position for at least two hours. The slide, lying across two glass rods, is covered with an aqueous solution of Giemsa in the proportion of one drop to 1 cc. of distilled water. After two or three minutes it is drained by lateral tilting, replaced horizontally, and covered with Leishman's stain, again in the proportion of one drop to 1 cc. of distilled water; the stain itself being made by dissolving one of Burroughs Wellcome's tabloids in 10 cc. of absolute methyl alcohol. After standing for six or eight minutes it is drained by lateral tilting, washed in distilled water, and dried in the air in a vertical position. Chromatin is coloured a brilliant rose-red, protoplasm blue. This technique has been found to add 10 per cent. positives to cases judged negative by the film, and with a much smaller expenditure of time.

C. L.

MOUCHET (R.). **De la valeur clinique de la formule leucocytaire dans la malaria.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 275–280.

The writer's blood-counts show in malarial films a definite mononuclear, but not a large mononuclear, increase, the lymphocytes being augmented. The leucocytic formula is held to give to the medical man an excellent and certain diagnostic sign and an easy means of controlling the effects of treatment.

C. L.

SWAN (John M.). **A Contribution to the Question of the Leukocyte Formula in Malaria.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 283–288.

In 68 differential counts of his own a large mononuclear increase was constant neither in the acute nor chronic stage. If present, it is held reasonable to assume that the patient has or has had malaria.

C. L.

MAYNE (Bruce). **How Long does a Mosquito retain Malaria Parasites?** —*Public Health Rep.* 1922. May 5. Vol. 37. No. 18. pp. 1059–1063.

The maximum life of an *Anopheles punctipennis*, laboratory-bred and fed on dates and water, was 231 days, the temperature varying between 45° and 75° F. In one trial the average life-span of 85 specimens was 90·4 days, eight of them living from 175 to 203 days. In another series, given one to three feeds of blood and thereafter fed on fruit juices, the average life-span of 22 *A. punctipennis* was 100 days, of 4 *A. crucians* 65 days, and of 6 *A. quadrimaculatus* 73 days. The average life-span of infected mosquitoes does not appear to have been tested. Regarding the survival and viability of malarial parasites, an *A. punctipennis* was fed upon a crescent carrier. A volunteer host was bitten 55 days later, and in due course developed subtertian malaria microscopically established. On the 67th day this mosquito failed to cause infection of another volunteer on which she fed, although on the 68th day dissection showed very active sporozoits in her salivary glands. A second mosquito was found to harbour living sporozoits on the 70th day after failing to infect on the 61st, while in a third the corresponding figures were 71 and 66. Sporozoits, apparently dead, of *Plasmodium falciparum* were found as late as the 95th day, and of *P. vivax* on the 105th day.

C. L.

SINTON (J. A.). **A Simplified Method for the Cultivation of** *Plasmodium falciparum* **in vitro.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 203–209. With 1 plate.

——. **Further Remarks on a Clinical Method for the Cultivation of the Subtertian Malaria Parasite** *in vitro*, **with a Note on its Use in Diagnosis.**—*Ibid.* pp. 210–214.

Since it was felt that cultural methods might facilitate the diagnosis of latent malaria, investigation was undertaken with a view to lessening the amount of blood required for these, and reducing the number of transfers from tube to tube. The whole apparatus, with the exception of some glass beads and a pipette, is made from a single piece of glass tubing about a foot long and 4–5 mm. wide. The description of manufacture cannot be satisfactorily summarized, but those wishing to repeat the technique will find it fully detailed in the original. The statement that the best growth of malarial parasites occurs on the surface of a layer of erythrocytes, and that this must be covered by a pool of serum at least 12, but preferably 24–48 mm. deep, governs the details of manufacture. In view of the difficulty of obtaining from the finger of an anaemic malarial case sufficient blood before clotting occurs, to produce the requisite quantity of serum, this last is replaced by ascitic, or, as Sinton finds equally efficacious, hydrocele fluid.

When the temperature of the incubator was adjusted at about 37° C., or a little lower, growth was at its optimum; when between 38° and 41° C. development rarely proceeded beyond half to two-thirds growth, sporulation being exceptional [which suggests that the malarial febrile reaction is inimical to the parasite]. Later it was found that, in a thermos flask filled with water at 40° into which the culture tube was lowered, the temperature drops to 38° before it is closed, and thereafter half a degree hourly; and that a temperature of between 32° and 38° C. is suitable for growth; so that by filling such a flask with water at 40° every 12 hours, the result is satisfactory for the growth of the subtertian parasite.

The routine recommended for the diagnosis of malaria is the following, carried through till a positive finding results. Examination of a thin and then of a thick film by one of the recognized techniques. Similar examination in thin and in thick films of cultures 24 and 48 hours old. Treat the balance of the cultures as follows:—Decant the serum for use in other cultures and haemolyse and decant the sediment by adding to it 1 per cent. commercial formalin. Centrifuge, decant and repeat the washing with formalin as often as is necessary to give a clear supernatant fluid. Wash and centrifuge twice in water. Replace the water by a small quantity of serum and examine the residue in thick and in thin films. " By using the steps given above it is often possible to find parasites when examination of the peripheral blood by both the thin and thick film methods has proved unsuccessful."

Actual evidence of the extent to which this technique, with its use of small quantities only of peripheral blood, and of serum carried over from a previous culture, is effectual in giving an accurate positive and negative diagnosis will be awaited with interest.

C. L.

BASS (C. C.). **Some Observations on the Effect of Quinine upon the Growth of Malaria Plasmodia in vitro.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 289–291.

To 2 cc. of the ordinary defibrinated dextrose blood culture of *Plasmodium falciparum* was added 0·005 cc. of a 15 per cent. solution of quinine bihydrochloride, corresponding to 2 gm. in the total blood volume of a man of 150 lb. After five hours' incubation no growth had occurred, some parasites had shrunk into small spheres, most stained badly, a few stained deeply. After 29 hours the plasmodia barely stained and were evidently dead. In a control they developed excellently.

To one of two tubes, each containing 2 cc. of blood culture, quinine was added as above; the other was untreated. After 20 minutes both were centrifuged and the sera interchanged. At the end of 29 hours, in the tube whose corpuscles had been in contact with quininized serum for 20 minutes, nearly all parasites had disappeared, those remaining being shadowy. In the tube whose corpuscles were only mixed with serum after this had first been in contact with other infected corpuscles for 20 minutes the contained parasites were much more evident. These results were twice repeated with similar results, and are held, so far as they go, to " show that quinine in therapeutic proportions prevents the growth of malaria plasmodia *in vitro*, and, in fact, kills them." Only *Plasmodium falciparum* was used.

C. L.

VAN DEN BRANDEN (F.) & VAN HOOF. **Le paludisme peut-il fausser le résultat de la séro-réaction de Bordet-Wassermann ?**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 3–6.

In 15 cases the Wassermann reaction, carried out with the antigen of BORDET and RUELENS and by the technique of CALMETTE and MASSOL, proved negative in all but one. In this one there were obvious stigmata of congenital syphilis, and the mother, too, was positive. It is not always clear what species of parasite is in consideration, since the terms *Laverania malariae, Plasmodium malariae* and *Plasmodium praecox* are all used.

C. L.

SERGENT (Edmond & Etienne), with PARROT (L.) & DONATIEN (A.). **La prophylaxie du paludisme en Corse.**—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. Mar. Vol. 2. No. 1. pp. 1–51. With 5 maps in text.

The first part of this communication, dealing with epidemiology, has already been dealt with [this *Bulletin*, Vol. 19, p. 280]. The second treats of prophylaxis. The big drainage canals in the eastern coastal plain of Corsica, instituted years since, have failed to drain the marshes and are themselves anopheline breeding-places. Small breeding-places are there in legions, and during their tour the writers were able to find but one instance in which care of a single possible breeding-place was evident. They discovered also but three persons using mosquito nets. In two of these an Anopheles was snugly enclosed with the sleeper. In the third provision was made for the mosquito's easy entry. Similarly but one satisfactorily screened house was discovered. The railways, for instance, have screened their premises at great expense, but do not keep them in order. ROUBAUD and LEGER had found that Corsican Anopheles prefer man to beast, and had noted as an exception a Corsican farm where, in the spring of 1921, the stable harboured these in plenty, the house containing none. In the autumn of that year the Commission found in the stable no female Anopheles, while in the house they caught six in a few minutes, one replete.

Recollecting that of the 80,000 persons inhabiting the Eastern Corsican Plain, only some 5,000 (indigent or tied by their occupations) remain there the year round, that they are heavily infested, that Anopheles are universal, and that the immense drainage works already carried out have had no obvious effect upon malaria, it is concluded that concentration upon disinfestation of the human population offers the means most likely to be effective in checking malaria. To combine cure with prophylaxis in one dosage is aimed at, and the means advised are that every adult should take every day 0·4 gm. of quinine sulphate for the seven months, April to October, children having proportionate doses. This means of attack should be started in selected centres, and carried out, under the Sanitary Officer, by an individual who will himself see the quinine swallowed by every person in his jurisdiction every day. He must be keen, disciplined, absolutely conscientious and satisfied with a pay of 100 francs a month for seven months only in the year.

C. L.

MARCOU (H.). **Les causes de l'aggravation du paludisme en Corse.**—*Presse Méd.* 1922. Aug. 19. Vol. 30. No. 66. p. 1380.

This contribution to the problem of malaria in Corsica, a problem which is acutely exercising French minds [see above], holds that the emigration now proceeding from Corsica can best be stopped, not by attacking the Anopheles, but by eliminating malarial parasites from their human hosts, thus rendering Anopheles as harmless as transmitting agents in Corsica as they are in Paris. The writer's suggestion is that each district should organize its own mobile anti-malarial staff, consisting of doctors, druggists, nurses, and especially school masters, to whom is to be entrusted the diagnosis of malaria by splenic palpation of the children they teach. In this way, " with much goodwill and at little cost the cure of all the fever-stricken will be attained." His own comment is that goodwill is rarer than silver.

C. L.

DAVID (J.). **La pratique antipaludéenne en Basse-Galilée.**—*Rev. Méd. et Hyg. Trop.* 1922. Jan.-Feb. Vol. 14. No. 1. pp. 5–11. With 1 chart in text.

The plain of Esdraelon and the shores of the Lake of Tiberias, 200 metres below sea level, are among the most fertile and most malarious spots in Palestine, and are the sites of ever-growing European colonies. In August, 1920, some 600 Europeans were introduced to construct an embankment on the western shore of the lake. The blood of all these was examined on arrival. Any person found infected with malaria was admitted to hospital and received two intramuscular injections, at intervals of 12 hours, each of 2 gm. of bihydrochloride of quinine ; and thereafter three times a day for 10 days a pill containing 0·1 gm. (1½ gr.) of hydrochloride of quinine. All persons subsequently found infected were similarly treated. Prophylaxis was limited to a daily dose of 0·3 to 0·6 gm. of quinine hydrochloride. Cases where gametocytes were discovered received a single intramuscular injection of 0·2 gm. iodine, 2 gm. salol, and 10 cc. of olive oil, a second injection rarely being given since these elements usually disappeared. In cases where blackwater fever was feared an injection of 0·05 gm. (1 cc. of a 5 per cent. solution) was given 2–3 days before the massive dose ; or " vaccination subintrante " was practiced by injecting at 2, 4 and 6 p.m. 1, 2 and 5 cc. of a 5 per cent. solution of quinine, and at 8 p.m. 4 cc. of a 50 per cent. solution, this dosage being repeated 12 hours later.

Of the 600 men 20 per cent. became infected with malaria ; 80 with subtertian and 47 with benign tertian parasites. Only 6 of the 80 subtertian subsequently showed a benign tertian infection, although 14 relapsed. The benign tertian infections showed 10 relapses. Among 50 cases regarded as primary and treated immediately as above, no relapse occurred. Of chronic cases 20–25 per cent. relapsed and required prolonged treatment.

C. L.

BLANCHARD (M.). **Les insuccès de la quinine préventive dus à l'insolubilité des comprimés.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 293–295.

Blanchard attributes much of the failure of prophylactic quinine to the fact that it is not infrequently taken in tablet form, and he submits the following facts for consideration. There are three types of tablet; the type which disintegrates in the mouth so that it has no advantage, so far as taste goes, over the powder; the type, not uncommon on the Ivory Coast, which is incommoded neither by hitting it with a hammer, nor by keeping it in water, or even dilute hydrochloric acid for three years with a daily shake; and the type of intermediate durability which is used in the French Colonies. One of this last type, containing 0·25 gm. of quinine, was administered to each of 44 persons who were without gastro-intestinal trouble, whose urine was tested 6 and 24 hours after ingestion by Tarnet's reaction, and whose stools were washed. Only 5 of them gave chemical evidence of urinary excretion of quinine, in 22 the tablet was recovered from the faeces intact or in a serviceable condition, while in 3 more it had been partly disintegrated. In a subsequent test with quinine solution of the same amount all these 44 persons gave the Tarnet reaction 6 hours after ingestion. Other experiments by KEROZORÉ under the orders of the Chief Medical Officer, showed that when 2 gm. of quinine in tablet form were ingested, 4 cgm., or 2 per cent. only, was eliminated in the urine during 24 hours.

C. L.

ATKEY (O. F. H.) & GRANTHAM-HILL (C.). **Preliminary Note on the Use of Novarsenobillon as a Prophylactic against Malaria in Areas where Heavy Infection is Unavoidable.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 61–63.

Of the railway staff between Wad Medani and El Obeid in the Southern Sudan, 36 out of 50 suffered during 1919 from malaria and 15 were admitted to hospital. During 1920, 19 of a staff of 45 had 0·9 gm. of novarsenobillon, 26 acting as controls. Of the former, 1 had malaria but was not admitted to hospital; of the latter, 15 had malaria and 5 were admitted to hospital. During 1921, 250 [apparently 267] persons had 0·45 gm. of novarsenobillon in one injection; of these 156 resided at two large stations where proper observation was possible; the incidence among them was 17, or 3·5 per cent., whereas among 219 controls it was 50, or 9·5 per cent. In the other stations the admissions to hospital for fever and the cases of enlarged spleen were as follows:—In 1920, 37 and 61 in a staff of 313; in 1921, 9 and 29 in a staff of 369 of whom 111 had received 0·45 gm. of novarsenobillon. The rainy season of 1921 gave a precipitation of three times the normal. Diagnosis, if made at all by a medical man, was apparently clinical.

C. L.

LEMOINE (G. H.). **Prophylaxie et traitement du paludisme.**—*Jl. de Méd. et de Chirurg. pratiques.* 1922. Aug. 10. Vol. 7c. No. 15. pp. 539–547

PANSINI (Giovanni). **Atonia muscolare laringea in soggetto malarico.**—*Policlinico.* Sez. Prat. 1921. Dec. 12. Vol. 28. No. 50. pp. 1688–1689.

SLEEPING SICKNESS.

CROSS (H. E.) & PATEL (P. G.). **A Note on the Transmission of Surra by Ticks.**—*Department of Agriculture. Punjab. Veterinary Bull. No. 6 of 1921.* 3 pp. [Received Nov. 1, 1922.]

During their investigation of surra the authors reached the conclusion that the spread of surra is not solely due to winged and comparatively short-lived insects—*Tabanidae*, *Stomoxys calcitrans*, fleas—but that those insects or arthropods which can survive for over a year may also play some part in the spread of the infection. It has been observed that:—

1. Surra breaks out frequently in the same district and stables though, so far as could be ascertained, the disease had not been imported into that district.

2. In one outbreak of surra the disease first made its appearance among ponies kept in a certain stable. For two years this stable was not used; two years later, when ponies were again placed in this stable, cases of surra appeared.

In the Punjab only one species of *Ornithodorus* is known, viz., *O. lahorensis*, whilst another species, *O. savignyi*, has been recorded from Gujrat district, Bombay Presidency, Central Provinces and Madras Presidency. During a fly survey the authors found a tick resembling *O. lahorensis*, which BRUMPT determined to be a new species and named *O. crossi*; this species was found in large numbers in the Murree Hills.

Sixteen transmission experiments were carried out with this new species of tick. The ticks were first fed on camels, the blood of which contained numerous trypanosomes; some of the ticks were interrupted in the middle of their feed and after an interval of 1 to 20 minutes allowed to finish their feed on healthy animals; the other ticks were allowed to complete their feed on the infected camel and then, after intervals varying from 5 to 22 days, were placed on healthy animals; in no case was surra transmitted. Those ticks which had had an interrupted feed, and were allowed after 1 to 20 minutes to finish their feed on healthy animals, were again fed on healthy animals 34 days later, but no infection resulted. The maximum number of ticks used in these experiments was 18 and the minimum 5.

Ten ticks failed to infect a healthy animal 46 days after the infected feed; after a further interval of 21 days these ticks (both those which had had interrupted and uninterrupted feeds, 42 in number) and two *O. lahorensis*, which had 22 days previously fed on infected animals, were fed on a healthy rabbit and 10 days later trypanosomes appeared in its blood. In view of this surprising result the *O. crossi* (36 in number) were fed after a further interval of 16 days on a healthy rabbit and the two *O. lahorensis*, after an interval of 14 days, on a healthy rat; the rabbit became infected, but not the rat. The 36 *O. crossi* were again fed, 18 days later, on another rabbit which also became infected.

From this it follows that the ticks *O. crossi* transmitted the disease to rabbits, 67, 83 and 101 days after the infected meal. Further details require to be worked out. The fact that *O. crossi* is capable of transmitting surra after a long interval may explain why the disease breaks out yearly or periodically in the same stables and in the same district; though so far as can be ascertained cases of surra have not been imported into these stables or districts.

W. Yorke.

HOARE (Cecil A.). **Trypanosomiasis in British Sheep. Preliminary Communication.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. pp. 188–194. With 11 figs.

The author examined the blood and made blood cultures in broth from about 50 sheep in Hertfordshire. All were infested by keds. The blood films were invariably negative, but the cultures revealed the presence of trypanosomes in 80 per cent. of the animals. It is well known that the sheep-ked (*Melophagus ovinus*) is nearly always infected with the flagellate known as *Crithidia melophagia*. In order to prove beyond doubt that the ked transmits trypanosomes to sheep, the author performed experiments on three new-born lambs, the blood of which was found to be free from parasites by a number of blood cultures. In the first experiment, 200–300 keds from an infected sheep were placed on one of the lambs. Blood films made every day were negative; the first culture was made a week after the experiment commenced and seven days later was found to contain trypanosomes, thus proving that the sheep trypanosome was transmitted by the ked.

With regard to the manner in which the ked infects the sheep, two methods appeared possible—(1) through the bite of the ked and (2) by the sheep eating or crushing the keds and thus liberating the flagellates which penetrate into the blood from the mucous membrane or through an abrasion of the skin. The latter method appeared more likely, and to prove it the contents of the abdomen of 50–60 keds, thoroughly mashed up in saline, were introduced into the second clean lamb *per os*. After 18 days trypanosomes were found in the blood and appeared also in cultures.

In order to ascertain whether trypanosomes can be transmitted by the bite of the ked, about 160 keds removed from an infected lamb and starved for 24 hours were allowed to bite a third clean lamb through gauze. The result was negative, showing that sheep can be bitten by infected keds without acquiring infection.

The investigation of the trypanosome in the ked's gut is not yet complete, but the facts so far obtained show that the parasite, which is present in the form of a Crithidia in the mid-gut of the ked, is transformed into a small trypanosome in the hind-gut, the walls of which are lined with this form, and which is undoubtedly the infective stage taken up by the sheep. This is at variance with KLEINE's statement that the flagellates found by him in the proboscis are the important factor in transmission.*

Cultures obtained from the insect and also from the sheep's blood were maintained for nearly a year. They will not grow beyond 30° C. and will not develop in the N.N.N. medium. Attempts to infect sheep and laboratory animals by inoculation of the cultures failed. The trypanosome does not appear to have any pathogenic effect under ordinary conditions.

According to the rules of zoological nomenclature, the sheep trypanosome and the Crithidia of the ked now bear the name of *Trypanosoma melophagium*.

W. Y.

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* *Deutsch. tierärztl: Woch.* 1919. Vol. 37. p. 408.

CARPENTER (G. D. Hale). With note by WIGGINS (C. A.). **Report of Senior Medical Officer in charge of Sleeping Sickness for 1920-21.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1921.* pp. 90–95.

The author gives information concerning an extensive tour of the sleeping sickness area of Uganda made by him. The islands of Bulago and Kimmi (Victoria Nyanza) were visited to initiate what it is hoped will be an adequate test of the method of attacking Glossina by enticing it to deposit larvae in artificial breeding-places where the pupae can subsequently be searched for and destroyed. The main object of the tour was to ascertain the amount of sleeping sickness, whether any portion of the large areas now closed could be opened under permits, and whether the boundaries of the closed areas might not in places be modified. In the Katwe area, 1,226 people were examined, and three new cases of sleeping sickness found. In the Mpologoma area, 2,093 people were examined in Busoga, and no new cases were found, while in Bukedi five new cases were found amongst a population of 14,913. In the Siroko Valley area, 1,027 people were examined, but no cases were found. In the Toro sleeping sickness area, endeavours to collect natives for examination failed. In the Waki area one case of sleeping sickness was found, and in the Madi and West Nile districts 255 cases were found amongst 33,553 people examined.

In each instance the action taken on the report is summarized.

An outline is given of future work, and sundry recommendations are made.

W. Y.

LUISI. **La trypanosomiase humaine au Togo Français.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. June. Vol. 3. No. 16. pp. 92–102.

The opinion is expressed that the Germans over-estimated the importance of sleeping sickness in Togoland. In his researches into the epidemiology of the disease, Luisi has concerned himself mainly with (1) the density of the infection ; (2) the degree of contagiousness ; and (3) the coefficient of mortality.

Sleeping sickness seems to have appeared in Klouto for the first time about 1850. In 1903–04, HINTZE and KRUEGER commenced to catalogue systematically the origin and number of cases which they had to treat. In 1908 HELLEN examined 27,000 natives and found only 80 cases of the disease. In a table the geographical distribution of these cases is given, showing that they were widely disseminated, in equal degree, all over the district of Klouto. From these facts Luisi concludes that the disease has spread with extreme slowness and has exhibited but a slight degree of contagiousness.

In 1910 the figures of the German sleeping sickness commission show that there were in Togoland 262 cases of the disease, and that of these 53 came from the Klouto district. In a table the German statistics for 1913 and 1914 are given ; this period was one of intense activity of the German anti-trypanosomiasis work. It is seen that during this period there were 83 fresh cases admitted to the Misahohe camp, and that they all came from the Misahohe district, the disease being apparently non-existent in the other districts of Togoland. To speak of such a state of things as a "social scourge" is unbounded exaggeration.

W. Y.

LONJARRET. **La trypanosomiase humaine dans le territoire du Togo.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1922. Jan.–Feb.–Mar.–Apr. Vol. 20. No. 1. pp. 18–21.

Notwithstanding the most patient investigations, in which the whole native population of Togoland was examined, only 342 cases of sleeping sickness had been found by the Germans up to the middle of 1914. Lonjarret agrees that it is an exaggeration to apply the term " social scourge " to a disease which involves so small a number of victims. Its importance is trifling compared with that of syphilis, which really merits the name " social scourge," as it is slowly but surely destroying the race. Lonjarret adds that, although trypanosomiasis is not a very serious problem, it would be a great mistake to ignore it, and concludes by enumerating certain measures which he thinks should be taken.

W. Y.

'S HEEREN. **Rapport sur la Mission de la maladie du sommeil de l'Uele.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 83–110. With 1 map in text.

The following are the conclusions :—

> The observations recorded in the course of this report show that one can strangle sleeping sickness by therapeutic means. Analogous observations have been made in the French Congo.
>
> So far as the territories of the Bas-Uele are concerned, the last sleeping sickness census shows clearly that in those regions where medicinal measures have been continued since 1914, *e.g.*, Ibembo, Monga, Yakoma, the disease is in full retrogression ; in those regions where medicinal prophylaxis and medical supervision have been interrupted owing to the war the disease has progressed.
>
> In order to strengthen the action of medicinal prophylaxis and to prevent the extension of the disease by movements of carriers of the virus and consequent infection of natives in regions at present free administrative measures must be intensified.
>
> The districts of Gwane and Bili should be provisionally closed to commerce.
>
> The doctors in charge of the prophylactic work should be given limited penal powers, and when they are in charge of hospitals these powers should be further extended.

W. Y.

ARCHIBALD (R. G.). ***Trypanosoma rhodesiense* in a Case of Sleeping Sickness from the Sudan.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 339–340.

Three cases of sleeping sickness were brought to Khartoum from Tembura in Bahr-el-Ghazal Province of the Sudan. Two months previously trypanosomes had been found in the gland juice of all the cases, and each had been given two injections of 0·5 gm. of atoxyl. Gland puncture at Khartoum was negative, and it was decided to inoculate three healthy gerbil rats with the gland-juice obtained from one of the patients, who showed evidence of somnolence, marked enlargement of the lymphatics of the neck and axilla, and slight pyrexia. After 66 days one of the rats showed an intense infection, and stained preparations of its blood showed posterior nuclear forms. Further details will be published later, but it can be said that the morphological characters of the trypanosome and its pathogenicity justify the conclusion that it is *T. rhodesiense.*

W. Y.

TALIAFERRO (W. H.) & TALIAFERRO (L. G.). **The Resistance of Different Hosts to Experimental Trypanosome Infections, with Especial Reference to a New Method of Measuring this Resistance.** —*Amer. Jl. Hyg.* Baltimore. 1922. May. Vol. 2. No. 3. pp. 264–319. With 18 figs.

The authors summarize their results as follows :—

" 1. The conclusions reached in this paper are based on the study of 13 experimental infections with trypanosomes, divided as follows : *T. lewisi* in the rat (2), *T. equiperdum* in the rat (1), *T. equinum* in the rat (1), *T. brucei* in the dog (1), mouse (1), and guinea-pig (1), and *T. rhodesiense* in the rat (3), mouse (1), dog (1), and guinea-pig (1). In the study of these infections determinations of the number of trypanosomes per cmm. of blood were made on 125 days, and drawings, measurements, and computations of statistical constants were made for 114 sets of 100 trypanosomes each.

" 2. The resistance which a host builds up toward a trypanosome infection may do one or both of two things : (*a*) it may retard the rate of reproduction of the parasites, or (*b*) it may destroy the parasites after they are formed.

" 3. These two conditions can be differentiated by ascertaining : (*a*) the changes in the number of parasites per cmm. of blood, supplemented by (*b*) the changes in the coefficient of variation for total length of the trypanosomes, which gives a comparative measure of their rate of reproduction, irrespective of the number destroyed in consequence of the resistance. These two determinations differentiate between the two types of resistance because :

The number of trypanosomes per cmm. of blood = the number produced by reproduction of the parasites—the number destroyed in consequence of the resistance.

" 4. The validity of the coefficient of variation for total length, as a measure of the rate of reproduction of trypanosomes, is discussed in detail on page 305. Its great value lies in the fact that it measures the rate of reproduction irrespective of the number destroyed by the resistance.

" 5. Three conditions have been found in regard to the resistance to trypanosome infections.

" (*a*) In the non-pathogenic *T. lewisi* in the rat, there is a resistance built up which is directed both toward a retardation of the rate of reproduction of the parasites, and toward their actual destruction after they are formed (rats 105 and 116).

" (*b*) In the continuous infections : *T. rhodesiense* (with the exception of the long infection in rat 709), *T. brucei, T. equiperdum* in the rat, and *T. brucei* and *T. rhodesiense* in the mouse, there is no evidence of any resistance being built up, either toward the rate of reproduction or toward the destruction of the parasites, after they are formed. In two of these infections (rat 619 and rat 703) there is some evidence that the rate of reproduction of the parasites increases as the infection progresses (rats 703, 705, 709, and 619, and mice 728 and 724).

" (*c*) In the relapsing infections : *T. equinum* in the rat, *T. rhodesiense* and *T. brucei* in the dog and guinea-pig, the host builds up a resistance directed toward a destruction of the parasites, after they are formed, but it does not affect the rate of reproduction of the remaining parasites (rat 729, dogs 713 and 714, and guinea-pigs 719 and 721)."

W. Y.

NOC (M.) & BAURY. **Étude biologique du liquide céphalo-rachidien dans un cas de trypanosomiase humaine.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1920. July. Vol. 2. No. 7. pp. 190–193.

The case on which this paper is based was that of a patient in the native hospital at Dakar. Trypanosomes were found neither in the centrifuged blood nor in the gland-juice. Spinal puncture showed that the tension was normal; the fluid was clear and transparent, but, on centrifuging, scanty trypanosomes were found. Punctures made two days later provided fluid of the same characters. The leucocytes were increased in number—about 300 per cmm. The following was the leucocyte formula:—

	Per cent.
Polynuclear leucocytes	15
Lymphocytes	20
Transitional mononuclears	23·3
Large mononuclears	38·3
Eosinophiles	3·3

An abundance of mononuclear leucocytes is a sign of great value in the diagnosis of trypanosomiasis complicated by a cerebral invasion, and in cases where trypanosomes were not found suggests trypanosomiasis rather than syphilis.

Examination of the cerebrospinal fluid for albumen gave an abundant precipitate. The quantity of glucose was normal. Bile pigment was absent, as were also acetone and diacetic acid.

The cerebrospinal fluid haemolysed strongly the erythrocytes of the sheep; the fixation reaction with syphilitic antigen was positive. The authors were of opinion that cytological and chemical examination of the cerebrospinal fluid should be made during treatment, as they would furnish precise information of its value in each particular case.

HECKENROTH, who took part in the discussion, refers to the work of BLANCHARD and himself [this *Bulletin*, Vol. 3, p. 251]. In their observations on 64 patients they examined the cerebrospinal fluid, firstly, from the point of view of protective antibodies, which were found to be absent in 10 cases, and, secondly, from the point of view of haemolysins, which were absent in 17 cases examined. They also found that in 37 patients in various stages of the infection the meninges were impermeable to potassium iodide, that in 4 patients they were impermeable to atoxyl, in 2 to tartar emetic, and in 4 to salvarsan.

W. Y.

STEVENSON (A. C.). **Demonstration of Sections showing *Trypanosoma gambiense* in the Brain Substance of a Case of Sleeping Sickness.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. p. 135. With 1 plate.

Trypanosomes were demonstrated in sections of the brain of a case of chronic sleeping sickness; they were most easily found in the frontal lobe, but were also seen in the pons and medulla oblongata; they were rather more frequent in the white matter than in the grey.

W. Y.

i. NOGUE. **Note sur le fonctionnement de la polyclinique de l'hôpital indigène de décembre 1918 à juillet 1919.**—*Bull. Soc. Méd. Chirurg. française de l'Ouest-Africain.* 1919. Oct. Vol. 1. No. 3. pp. 28–33.
ii. ——. **Un cas de trypanosomiase avec mouvements choréoathétosiqués et incoordination cérébelleuse très marqée.**—*Ibid.* 1920. July. Vol. 2. No. 7. pp. 196–197.
iii. —— & JOUENNE. **Un cas de trypanosomiase intéressant par le lieu possible de la contamination.**—*Ibid.* Dec. No. 10. pp. 289–290.

i. The author records that 15 cases of sleeping sickness came under observation at Dakar during the period in question. Pruritus seemed to be a symptom of greater importance than is usually considered, and appeared to be a constant symptom in non-treated cases. Other symptoms which have not hitherto been recorded, or only rarely so, are referred to. One patient exhibited continual athetosis of the right hand and later paralysis of the right arm and leg. Testicular insufficiency was noted in a boy of 15 years of age, and was characterized by infantilism and by abnormal development of the breasts, buttocks, and subcutaneous adipose tissue. Instead of the usual tachycardia, pronounced bradycardia was observed in one case.

ii. The details are given of the symptoms exhibited by a case of sleeping sickness, in the cerebrospinal fluid of which trypanosomes were found, but not in the blood. The most interesting symptoms were :—

1. Incessant movement of the face and arms.
2. Extremely pronounced cerebellar inco-ordination.

The speech was very slow and jerky ; intelligence was relatively slightly impaired ; the memory was fairly good ; the patient slept but little during the day, and the general condition was fair.

iii. Nogue and Jouenne give brief details of a case of sleeping sickness in a girl, aged 12 years, who was born in Dakar and had never left it, except to go to Médina, a village less than a mile away.

In the discussion HECKENROTH points out that tsetse have never been found in Dakar or Médina, and considers that there are two possible ways in which infection may have occurred : first, by the bite of a stray infective Glossina carried into the town by the train from the region of Sangalcam, 25 kilometres away ; or, second, mechanically, from another case of sleeping sickness (cases frequently visiting Dakar for treatment, etc.) by means of mosquitoes.

W. Y.

i. MAYER (Martin) & ZEISS (Heinz), with GIEMSA & HALBERKANN. **Weitere Beobachtungen ueber das Verhalten des neuen Trypanosomenheilmittels " Bayer 205 " im Blute.** [Further Observations on the Behaviour of the New Trypanosome Remedy, " Bayer 205," in the Blood.]—*Archiv. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 5. pp. 140–146.
ii. —— & MENK (W.). **Beitrag zur Behandlung der Schlafkrankheit mit " Bayer 205 " und dessen Verhalten im menschlichen Körper.** [The Treatment of Sleeping Sickness with " Bayer 205 " and its Behaviour in the Human Body.]—*Ibid.* No. 7. pp. 208–212.
iii. ——. **Ueber Resorption und Wirkung des Trypanosomenheilmittels " Bayer 205 " bei innerlicher Behandlung.** [The Absorption and Action of " Bayer 205 " after Oral Administration.]—*Ibid.* No. 8. pp. 237–243.

i. In previous communications [this *Bulletin*, Vol. 19, pp. 133 and 508], Mayer and Zeiss have shown, by means of biological tests, that " Bayer 205 " circulates in an active form for prolonged periods in the blood. The present investigation was undertaken to ascertain whether the drug was bound up with the blood proteins. The point was examined firstly by the method of ultra-filtration, using the apparatus devised by Giemsa, and secondly by the method of precipitation of the proteins. The conclusion reached is that " Bayer 205 " in the serum is bound up with the proteins, and especially with the albumen.

ii. Details are given regarding the treatment of a patient infected with *T. gambiense.* The disease was contracted in December, 1920, in the Belgian Congo. Notwithstanding treatment with atoxyl, soamin, tartar emetic, and salvarsan, the disease progressed and trypanosomes were present in the blood on March 28, 1922. On March 30 and 31, and April 3 and 8, 1 gm. of " Bayer 205 " was given intravenously. The last trypanosomes were seen 12 hours after the first injection. The only untoward symptoms noted were a cutaneous eruption, which became in places pustular, and some albuminuria accompanied by casts and epithelial cells. The author points out that the observation period is as yet too short to allow of conclusions, but the general condition of the patient on June 29, when he returned to the Congo, was good and the albuminuria had disappeared.

By means of biological tests it was found that the urine was active 12 days after the last injection of " Bayer 205," and the serum 13 days after.

A dose of 2 gm. of " Bayer 205 " was given orally to a case of tabes. Six hours later albumen appeared in the urine; the amount of albuminuria was greater than after intravenous injection, but it disappeared sooner.

iii. Two goats infected with *T. rhodesiense* were treated orally with " Bayer 205." The first was given 20 gm. of the drug within six days, five weeks after infection, when it was in a grave condition; trypanosomes disappeared quickly from the blood and the animal rapidly recovered condition and has remained well, with negative blood, for seven months. The second was given 2 gm. of the drug five weeks after infection; the blood became negative, but a relapse occurred a month later, when another 5 gm. of the drug was given by the mouth; the blood again became negative and remained so for four days, when 3 gm. of the drug was given subcutaneously; death occurred and was attributed to the action of the drug.

Another goat was protected against infection with *T. rhodesiense,* and a dog against *T. brucei,* by previous feeding with " Bayer 205 " ; the goat received 20 gm. of the drug at one dose a week before inoculation, and the dog a dose of 1 gm. on each of three consecutive days, 14 days before inoculation.

Details of a considerable number of experiments are given, showing that the serum of the infected goats withdrawn several weeks after oral treatment with " Bayer 205 " had a definite therapeutic action in mice infected with *T. equinum, T. brucei, T. equiperdum.*

The milk of the goat fed with " Bayer 205 " was found to exert a prophylactic action when given to mice which were subsequently inoculated with *T. equinum.*

A goat was given orally 60 gm. of " Bayer 205 " between March 22 and 29, 1922. It gave birth to young on April 2. On April 8 and April 19 blood was withdrawn from each of the two young animals and examined biologically. The results, which are given in a table, showed that the serum of one of the young exerted some therapeutic action in the case of a single mouse, suggesting that it contained traces of "Bayer 205." Twenty-four days after birth, this young goat was inoculated with *T. rhodesiense*, but became infected and died in the ordinary way.

W. Y.

BRUMPT (E.) & LAVIER (G.). **Mode d'action du "Bayer 205" sur divers hématozoaires: Trypanosomes, Piroplasmes, Theileries, Anaplasmes.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 613–621. With 1 text fig.

The drug was not observed to exert *in vitro* any action on *T. rhodesiense* and *T. venezuelense*. Therapeutic experiments conducted on mice and rabbits infected with *T. brucei*, *T. rhodesiense* and *T. venezuelense* gave satisfactory results similar to those already recorded by the German workers and others. Prophylactic injections of 1 mgm. in a mouse prevented infection with *T. brucei* and *T. venezuelense* 3 days later, with *T. venezuelense* 18 days later, and with *T. brucei* 16 days later, but a dose of 1 cgm. did not protect a mouse inoculated with *T. brucei* 26 days later, although the evolution of the disease was retarded.

The authors succeeded in reinfecting with the same virus two mice which had been cured of *T. venezuelense*. The first was inoculated on March 21 and treated four days later with 1 mgm. of "Bayer 205"; the second was inoculated on March 25 and treated four days later with 2 mgm. of the drug. Both animals were reinoculated on May 25; the second showed trypanosomes on May 27 and died on May 31, whilst the first also was found to be infected on May 27, but death did not occur until 23 days later.

The drug had apparently no action on *Theileria mutans* or *Anaplasma bovis*, nor did it have any effect on the course of the infection in a dog inoculated with *Piroplasma canis*.

W. Y.

i. VAN DEN BRANDEN & VAN HOOF. **Essais du silbersalvarsan et du sulfarsénol dans la trypanosomiase humaine.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 125–130.

ii. —— & ——. **Le "Stibényl" (acétyl-p-aminophényl stibiate de soude) dans la Trypanosomiase humaine.**—*Ibid.* pp. 37–41.

iii. VAN DEN BRANDEN (F.). **Sels de bismuth dans la trypanose humaine et le pian. Cacodyline dans le trypanosome humaine. (Communication préliminaire.)**—*Bruxelles-Médical.* 1922. Aug. 15. 2e année. No. 20. pp. 507–508.

iv. ——. **La méthode Marshall dans le traitement de la maladie du sommeil.**—*Ibid.* Jan. 1. 2e année. No. 5. pp. 119–120.

i. Reference is made to earlier work of van den Branden on the treatment of sleeping sickness patients by one dose of salvarsan, neosalvarsan, copper salvarsan and the sodium salt of copper salvarsan [this *Bulletin*, Vol. 7, p. 105; Vol. 16, p. 369]. Details are given of three cases which have not relapsed within five years after a single injection of neosalvarsan—0·75 gm. in the first case, copper salvarsan 0·2 gm. in the second, and the sodium salt of copper salvarsan 0·3 gm. in the third.

The conclusion is drawn that a single injection of the above drugs may exceptionally produce a definite cure.

In a table are given the results of treating five cases of sleeping sickness with silver salvarsan, which contains 12·7 per cent. of silver and 21·5 per cent. of arsenic. It was found that silver salvarsan did not exert a trypanocidal action superior to that of the above-named salvarsan compounds, or, in other words, that the combination of silver with the arsenical salt did not increase its therapeutic value.

The value of a new arsenical preparation, "sulfarsenol," was examined in a number of cases and was found to be equal to that of neosalvarsan. [In another paper it is stated that sulfarsénol is "le sel de sodium de l'éther sulfureux acide du monométhylolamino-arsénophénol."]

ii. Three cases of sleeping sickness were treated by stibenyl. One of the patients disappeared after the second injection; of the other two cases one has relapsed. The authors state that it appears to them that the drug is not likely to supplant tartar emetic.

iii. Tartrobismuthate of sodium and potassium suspended in oil was injected into the gluteal region in three cases of sleeping sickness. In the first case three injections were given at intervals of about four days, each injection consisting of 3 cc. (0·3 gm. of the drug). Trypanosomes did not disappear from the gland-juice until five days after the last injection. In the second case five injections of the same dose were given within 21 days without obtaining any definite peripheral sterilization. In the third case three injections were given. Trypanosomes were present three days after the last injection, but were absent for the following seven days.

Cacodyline, which the author states is well tolerated and allows of the introduction of a considerable quantity of cacodylate into the organism, was tried on two infected natives. The conclusion is that the drug is of no use in the treatment of sleeping sickness.

iv. Up to the time of writing, 18 cases of sleeping sickness had been subjected to MARSHALL's treatment [this *Bulletin*, Vol. 16, p. 368; Vol. 19, p. 141]. The results were not very encouraging, and details are given of eight cases in which no benefit was observed.

The salvarsanized serum did not appear to be irritating to the spinal canal, and the same applied to serum after injection of tartar emetic, atoxyl, soamin, silver salvarsan and galyl. The patients tolerated the injections well.

The conclusions are —

1. Intrathecal injection of salvarsanized serum is not a treatment of choice for sleeping sickness.

2. Apparently blood serum injected into the spinal canal does not result in cure, as MARSHALL believes, owing to its trypanolytic properties.

W. Y.

BROWNING (C. H.) & GULBRANSEN (R.). **An Interference Phenomenon in the Action of Chemotherapeutic Substances in Experimental Trypanosome Infections.**—*Jl. Path. & Bact.* 1922. July. Vol. 25. No. 3. pp. 395–397.

A parafuchsin-resistant strain of nagana "ferox" was obtained by feeding mice for prolonged periods with amounts of the drug insufficient to cause complete sterilization. The resistance of the strain was proved by inoculation into normal mice and those saturated with parafuchsin, both becoming infected in a similar manner.

It was found that the susceptibility of infections with the parafuchsin-resistant strain to treatment with aminoacridin compounds was manifested only when the inoculated animals were fed with ordinary food. When animals fed with parafuchsin were similarly inoculated with the strain resistant to parafuchsin and were then treated by an injection of acridin compound, the therapeutic effect of the latter was much diminished. Details are given in a table.

The authors consider that the expression " therapeutic interference " is appropriate for this phenomenon. Parafuchsin by combining with the protoplasm of the trypanosomes resistant to this drug protects the parasites from the harmful action of the acridin compound. According to this view both chemical substances (or the trypanocidal agents elaborated from them in the tissues) should combine with the same haptophore groups of the trypanosome protoplasm. The authors add, however, that the phenomenon appears only to be partially accounted for in this way.

W. Y.

VOEGTLIN (Carl) & MILLER (D. W.). **The Relative Parasiticidal Value of Arsphenamine and Neoarsphenamine. With a Description of the Trypanocidal Test.**—*Public Health Rep.* 1922. July 7. Vol. 37. No. 27. pp. 1627–1641.

In this paper the authors describe in detail experiments conducted with the object of determining the relative parasiticidal value of arsphenamine and neoarsphenamine [this *Bulletin*, Vol. 17, p. 332 ; Vol. 19, p. 143]. Their experiments were conducted on albino rats infected with *T. equiperdum*. Details are given in eight tables.

The conclusions are as follows :—

" 1. The results obtained in this investigation confirm previous data from this laboratory to the effect that arsphenamine of different manufacture is fairly uniform in parasiticidal power, whereas neoarsphenamine shows great variations.

" 2. The toxicity of the average commercial arsphenamine and neoarsphenamine manufactured at the present time is considerably lower than that of preparations found on the market two years ago.

" 3. The technique of the trypanocidal test as elaborated in this laboratory during the last few years is described in detail."

W. Y.

NUSSHAG (W.). **Ein Beitrag zur Übertragungsweise der Beschälseuche.** [The Mode of Transmission of Dourine.]—*Deut. tierärztl. Woch.* 1921. pp. 482–483.

The author considers possible means of transmission of dourine besides the usual sexual method, but is of opinion that these must be of rare occurrence.

Since the vast majority of the 148 dourine-infected Thuringian horses were kept in close contact with healthy animals, there was ample opportunity for spread of the diease, but, with only two exceptions, the origin of the infection was in all cases traced to coitus with an infected beast.

Details are given concerning the infection of two foals, the progeny of mares which were healthy at the time the foals were born, but which were shortly afterwards infected by dourine stallions. Possibly the foals were infected from the milk of the mothers [see this *Bulletin*, Vol. 17, p. 335–7].

W. Y.

BESSEMANS (A.) & LEYNEN (E.). **Valeur antigénique de certains Spirochètes et de différentes souches de Trypanosomes pour le diagnostic de la dourine chez les Equidés par la réaction de Bordet-Gengou.**—*C.R. Soc. Biol.* 1922. July–Sept. Vol. 87. No. 28. pp. 797–800.

In this work the authors examined the antigenic value of four strains of *Treponema pallidum*, of two strains of *Spirochaeta icterohaemorrhagiae*, and of three species of trypanosomes, viz., *T. rhodesiense*, *T. lewisi*, and a bird trypanosome.

It was found that if it is desired to obtain antigen from heavily infected blood of a guinea-pig, it is best to use parasites of the first infection and not those of relapses.

The serum of dourine horses does not deviate complement with *Treponema pallidum* or with *Spirochaeta icterohaemorrhagiae*, but it does so well with the different species of trypanosomes. This confirms the view that the reaction is only specific for the genus *Trypanosoma* and not for the species *equiperdum*. The authors' experience was that *T. equiperdum* did not necessarily exercise the greatest antigenic power, certain strains proving less active than strains of *T. brucei* and *T. evansi*.

W. Y.

REYNOLDS (Francois H. K.) & SCHOENING (Harry W.). **The Precipitation of Colloidal Gold in the Cerebrospinal Fluid of Horses with Dourine.**—*Jl. Infect. Dis.* 1922. July. Vol. 31. No. 1. pp. 59–63.

The following summary is given :—

"The colloidal gold test, when applied to the spinal fluids of horses suffering with dourine, in many instances gives reactions of varying intensity. A number of the reactions are similar to those in cases of cerebrospinal syphilis in which the peak of the curve is found at about the centre of the scale. In some instances, the reactions recorded attained a height of 5. In other cases the reactions showed a tendency to rise and stopped abruptly at 1, 2, and 3, then dropped to zero. This suggests the possibility that a more energetic curve might have been attained had the disease progressed to a greater degree before the destruction of the animal. Some of the curves are similar to those in meningitis, while no reactions of the paretic type were obtained.

"While reactions were obtained with the colloidal gold test, just what they may indicate cannot now be stated in the absence of careful study of the spinal cords. However, in the presence of a positive serum test and in some cases of clinical evidence, it would appear that the reactions would be of some significance.

"In many cases there appeared to be no agreement between the serum fixation, fluid fixation, and the globulin and colloidal gold tests ; but when consideration is given the active campaign against this malady and the rapid destruction of animals reacting to the serum fixation tests, and the remote chance of the disease progressing to any great length, it is not surprising that so few reactions to the fixation tests were obtained with spinal fluid. The apparent absence of globulin in many cases is not so disconcerting, as the test employed may not have recorded its presence sufficiently to make it discernible macroscopically ; further, other proteins, not detected by the method at hand, may have influenced the colloidal gold reactions.

"Several specimens of spinal fluid gave the complement-fixation test for dourine."

W. Y.

ZANDBERGEN (K.). **Trypanosomen en lage temperaturen.**—*Tijdschr. v. Vergelijkende Geneesk. enz.* 1922. Aug. 5. Vol. 7. No. 4. pp. 236–240. [French & English summaries. pp. 240–243.]

In this paper the author records further observations on the effect of low temperatures on various trypanosomes [this *Bulletin*, Vol. 19, p. 516]. When kept in the ice-box (or at 4–8° C.), *T. lewisi* remained motile for 50 days and infective for 43 days, *T. evansi* motile for 5 days and infective for 4 days, *T. equiperdum* motile for 5 days and infective for 2 days, *T. venezuelense* motile for 4 days and infective for 3 days, and *T. brucei* motile for 3 days and infective for 3 days. At −20° C., *T. lewisi* were fully motile after 1⅓ hours but no longer infective, *T. evansi* motile after 2½ hours but not infective, *T. equiperdum* not motile after 2⅛ hours and not infective after 3¼ hours, *T. venezuelense* doubtfully motile after 2¼ hours and not infective after 3 hours, and *T. brucei* motile after 2¾ hours and infective after 3¾ hours. At the temperature of liquid air (−190° C.) *T. lewisi* were motile and infective after 1 hour, *T. evansi* motile, but not infective, after 9–17 minutes, *T. equiperdum* motile and infective after 31 days, *T. venezuelense* motile after 30 days and infective after 60 days, and *T. brucei* motile and infective after 11 days.

W. Y.

TORRES (C. Magarinos). **Cultura do** *Schizotrypanum cruzi*, **Chagas, 1909 em meio liquido. Influencia da concentração dos ions de hydrogenio sobre a cultura. Verificação precoce do Shizotrypano no sangue.** [Cultivation of *S. cruzi* in a Liquid Medium. Influence of the Concentration of Hydrogen Ions in the Culture. Early Verification of *S. cruzi* in the Blood.]—*Brazil-Medico.* 1922. June 17. Year 36. Vol. 1. No. 24. pp. 317–319.

It is well known that *S. cruzi* can be cultivated on Novy-MacNeal medium ; it has also been grown on ordinary broth, but in this case the development is inconstant, probably owing to variation in the reaction of the medium. In previous experiments it was found that broth containing NaCl to the extent of 7 per cent. and peptone 5 per cent. was most favourable ; no growth took place in broth containing respectively 10 per cent. and 4 per cent. NaCl or in broth to which no NaCl had been added. The question of oxygen is also important, and it was found that cultures made in tubes sealed with vaseline quickly died, while those made in tubes not so sealed grew abundantly in 20–30 days, and would infect guinea-pigs after 49 days. The added blood is essential, the culture being most abundant on the surface of the red cells at the bottom of the tube.

In order to examine the influence of the hydrogen ion content, *S. cruzi* was inoculated into divers broths, the H ion concentration of which was determined electrometrically. The results are set forth in a table from which it is seen that the best development was obtained in broths in which Ph was between 6·55 and 7·18.

Notwithstanding the small quantity of infected blood introduced into the broth, the cultures in some tubes were very abundant—more so than those obtained on the solid medium of Novy-MacNeal.

The cultures remained alive for from 24 to 49 days and were infective for guinea-pigs after two to eight days. Guinea-pigs inoculated with cultures became infected more quickly than those inoculated directly with infective blood.

W. Y.

GLASER (R. W.). **A Study of** *Trypanosoma americanum*.—*Jl. Parasit.* 1922. Mar. Vol. 8. No. 3. pp. 136–144. With 4 plates.

The following summary is given :—

" *Trypanosoma americanum* was successfully grown in horse-blood medium and on the N.N.N. medium, as well as in cow-blood medium. Development in the culture media was traced, and the cytological details of the various stages described.

" *T. americanum* is specific to cattle. In freshly drawn blood and in very early cultures *T. americanum* resembles the majority of the forms found in 3 and 4 day old cultures.

" Morphological and experimental data are presented to show that *T. americanum* is structurally a Crithidium [*sic*]. Prolonged culture and environmental alterations have a tendency to produce herpetomonad types but never trypanosome types.

" Reasons are presented in support of the view that *T. americanum* is an intermediate evolutionary stage between true Crithidia and true trypanosomes. The name *Trypanosoma americanum* is retained."

W. Y.

DONATIEN (A.) & PARROT (L.). **Trypanosomiase naturelle du chien au Sahara (Note préliminaire).**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 549–551.

A natural infection of the dog with trypanosomes was found in the Sahara for the first time by VIALATTE, in 1915, who noted that the parasite resembled very closely *T. berberum*. Later (1920), DELANOË found a natural infection in a dog in Morocco which he believed to be *T. marocanum*. The present note relates to a second case in the Sahara at Touggourt ; clinical details are given. The parasite was long and thin, the nucleus central, the blepharoplast small, the length without the flagellum 16 μ to 24 μ, and the length of the free flagellum 5 μ to 8·75 μ. Mice, guinea-pigs and rabbits are susceptible to infection.

The authors believe the parasite to be *T. berberum*.

W. Y.

VAN SACEGHEM (René). *Trypanosoma theileri* **au Ruanda.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 113–114.

T. theileri was frequently found in blood films of Ruanda cattle. The shape and size were variable ; the larger forms measured 46 μ in length by 2 to 3 μ in breadth, and the smaller forms 37 μ in length by 2 μ in breadth ; the nucleus is oval and displaced towards the posterior portion of the body ; the micronucleus is round and situated some distance from the posterior extremity, and is often marginal ; the free flagellum is very long and the undulating membrane broad and folded ; the cytoplasm stains deeply and contains large vacuoles, and the posterior extremity is extremely effilated. Cultures were easily obtained in bouillon to which defibrinated blood was added.

W. Y.

LEGER (Marcel) & BAURY (A.). **Trypanosome de l'Ecureuil fossoyeur du Sénégal,** *Xerus erythropus.*—*C.R. Soc. Biol.* 1922. June 17. Vol. 87. No. 22. pp. 133–134.

A description is given of a trypanosome found by the authors in the blood of a squirrel, *Xerus erythropus*, in the vicinity of Dakar. In the fresh state the parasite is very motile, but does not exhibit the translatory movement characteristic of *T. lewisi.* In stained preparations the trypanosome had the following dimensions: posterior extremity to the centrosome $6\cdot5\mu$, centrosome to nucleus 11μ, nucleus $2\cdot5\mu$, nucleus to anterior extremity $7\cdot5\mu$, free flagellum $7\cdot5\mu$, greatest breadth $1\cdot75\mu$, and total length 33μ to $36\cdot5\mu$. The large centrosome is generally rod-shaped, the nucleus is much nearer the anterior extremity. No divisional forms were seen, nor were any indications of multiplication seen in the cardiac muscle. Massive intraperitoneal inoculation into a white rat, mouse and guinea-pig were negative.

The parasite is obviously of the *lewisi* type, but differs in being non-inoculable into the rat; it closely resembles *T. eburneense* (Delanoë), and possibly future investigations may show that it is really this parasite, but in the meantime the authors propose for it the name *Trypanosoma xeri.*

W. Y.

NIESCHULZ (Otto). **Zur Kenntnis einiger Vogeltrypanosomen.** [Some Bird Trypanosomes.]—*Arch. f. Protistenk.* 1922. Vol. 45. No. 2. pp. 241–263. With 2 plates & 8 text figs.

The author examined German birds, and found them much more frequently infected with trypanosomes than is commonly supposed. Trypanosomes were found in the following nine species of birds—in six species for the first time:—

Anthus pratensis.
Erithacus phoenicurus.
Phylloscopus trochilus.
Saxicola oenanthe.
Sylvia simplex.
Turdus torquatus.
Erithacus rubeculus.
Muscicapa atricapilla.
Turdus philomelos.

The main portion of the paper deals in considerable detail with the morphology of the parasites as seen in preparations of the blood and of cultures in blood-bouillon, and must be consulted in the original by those interested.

The paper is illustrated by two plates and a number of text figures.

W. Y.

FRANCHINI (G.). **Nouvelles recherches sur les trypanosomes des euphorbes et sur leur culture.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 299–303. With 1 text fig.

This paper gives the results of the author's attempts at cultivation on Nöller's medium of trypanosomes obtained by him from various Euphorbiae. It was found that the parasite grew better in the substance of the medium than on the surface, and that it was cultivated with most difficulty in Yoshida's tubes.

Examination of the cultures, especially in the fresh state, showed that there exists a close relationship between the trypanosomes of Euphorbia and other large parasites (round or oval), sometimes exhibiting amoeboid movements and having the appearance of amoebae, which accompanied the trypanosomes. There probably exists an intracellular stage in the development of the trypanosome.

W. Y.

i. Fletcher (T. Bainbridge) & Senior-White (R.). **Surra and Biting Flies : A Review.**—*Report of the Proc. of the 4th Entom. Meeting held at Pusa on the 7th to 12th Feb., 1921.* pp. 222–235. With 1 plate.

ii. Neveu-Lemaire. **Les grandes endémo-épidémies africaines. La maladie du sommeil.**—*Presse Méd.* 1922. Oct. 18. Vol. 30. No. 83. pp. 1733–1739. With 4 text figs.

iii. Rosenthal (F.) & Freund (R.). **Ueber den Mechanismus des Trypanozidieschwundes bei leberkranken Menschen.** [The Mechanism of the Disappearance of Trypanocidal Substance in Men suffering from Liver Disease.]—*Klin. Woch.* 1922. Aug. 26. Vol. 1. No. 35. p. 1748.

i. In this paper, which contains nothing new, the authors summarize the present position of knowledge regarding the transmission and spread of surra.

ii. This paper contains a general account of sleeping sickness of a semi-popular nature.

iii. This short note summarizes the work previously published by Rosenthal, Krueger and Nossen, which has already received notice [this *Bulletin*, Vol. 19, pp. 154 & 520].

W. Y.

REVIEWS AND NOTICES.

WENYON (C. M.), ANDERSON (A. G.), MCLAY (K.), HELE (T. S.) & WATERSTON (J.). **Malaria in Macedonia, 1915-1919. Parts I-V.** —*Jl. Roy. Army Med. Corps.* 1921. Aug.–1922. May. 137 pp. 6 plates, 20 figs., 8 charts & 1 map.

The five reprints here collected in one volume give a connected account of the work of the Malaria Inquiry Laboratory established at Salonika during the military operations in Macedonia, the authors being the officers of the laboratory staff, of whom the commandant was Colonel C. M. Wenyon, whose most instructive contribution occupies more than half the volume of reprinted matter. The original papers have already been noticed individually in the *Bulletin* (Vol. 18, pp. 326–327; Vol. 19, pp. 277–278, 295, 570, 585, and 828), but their value, both from the scientific standpoint as a digested record of a great malaria epidemic rationally handled, and from the practical standpoint as a classical lesson in the double art of war against malaria in an enemy country, entitle them in their united form to something more than a mere perfunctory acknowledgment.

Colonel Wenyon starts with a brief retrospect, in which the pestilential character of the occupied country is vividly depicted and the old lesson thereby illustrated that the losses caused by the deadliest series of military engagements are as nothing compared with those resulting from an unhealthy military location.

The British line of occupation, which extended in a great curve from the mouth of the Struma to the lower courses of the Vardar, lay mainly in the valleys of a broken country encompassed by lakes and rivers and intersected by streams, a country of springs and trickling waters and areas of swamp, eminently hospitable to the genus damnatus, Anopheles. In the valleys *Anopheles maculipennis* predominated; in the hilly grounds *A. superpictus.* Native villages supplied the malarial infection, and when they were evacuated the infection was already confirmed in the army. In the latter half of 1916 the number of admissions for malaria was over 30,000. In 1917, although the worst cases had been removed from the country at the end of 1916 and vigorous antimosquito operations had been in progress from the beginning of the year, the number rose to 70,000, being at the rate of 4,500 a week in the early part of September. In 1918, although the number of troops in occupation had been reduced by two divisions and preventive measures intensified, the admissions for malaria were at the rate of 650 a week in January, rising gradually to about 1,500 a week in March, and rapidly increasing to the middle of June; the worst cases (about 25,000) were then systematically weeded out and sent away, and this resulted in a remarkable fall to between 1,000 and 1,600 a week up to the end of October, followed by a steady decline to 500 in the last week of December.

Colonel Wenyon describes succinctly all the preventive methods systematically and energetically employed—measures against mosquito larvae and their haunts, against adult mosquitoes and their attacks, and against the establishment of the parasite in the blood. "Decidedly disappointing" is his verdict upon antilarva measures in the particular circumstances of a campaign in a foreign country. As he says, it is impossible to deal with the entire country beyond the lines of occupation, and impossible to determine the range of flight of a host of mosquitoes. He doubts much whether antilarva measures had any general effect in diminishing the number of sufficiently active mosquitoes; he doubts still more whether they had any effect in diminishing the spread of actual infection; and he gives it as his deliberate opinion "that the mosquito net did more to prevent infection than all the other methods of malaria prevention together."

"Disappointing in results" is also Colonel Wenyon's verdict upon quinine as a prophylactic—a decision argued with sobriety and judgment. It is admitted that in certain circumstances individuals may be protected by quinine, but where infected mosquitoes are very numerous and exposure to their bites extends over a prolonged term, any such general protection is doubtful. The author, however, refers to the history of a detachment of 305 men temporarily encamped on a site (not in Macedonia) apparently so delectable that any precautions whatever against malaria were thought unnecessary. "Practically every man" of the 305 "had malaria within two months." In Macedonia, where under similar conditions of exposure prophylactic quinine was taken, there was never such a high incidence in so short a time; and this leads the author to surmise that there may be something to be said for quinine as a prophylactic after all.

The conclusion of the whole matter of malaria prevention in the circumstances of a campaign may be heard in Colonel Wenyon's own words:

"Looking at the whole campaign against the mosquito one cannot help feeling that under the conditions which actually prevailed in Macedonia—and this is probably true of any campaign in a highly malarious country—if all the energy and money expended had been directed entirely to the protection of men against mosquito bites the malaria would not have been more, but probably less, than it was. In the case of a campaign in a mosquito-infected land these measures alone, if thoroughly carried out, would give a greater degree of protection than if the labour and expense were divided amongst this and other methods, such as those of clearing, or quinine prophylaxis, which may be very useful in times of peace or permanent occupation but have proved disappointing in Macedonia in time of war.* The money expended on prophylactic quinine alone would have supplied thousands of mosquito-proof huts and hospital wards and almost unlimited quantities of necessary gauze. It would have given each man a separate mosquito net instead of compelling him to share with another and would have enabled these to be replaced at once when damaged—always supposing of course that the necessary materials could have been obtained, and they probably could have been if their necessity had been insisted upon. A sufficient supply of all these things should be regarded as part of the necessary equipment of an army entering a malarious country. A mosquito net to protect against the mosquito is as much a necessity as the sun helmet to protect against the sun."

"For a campaign in a highly malarious country it seems to me that the following equipment should be at once available:—

"(1) Mosquito nets of two types: (*a*) Hospital nets of rectangular pattern with a calico strip round the base, (*b*) Bivouac type, in such numbers that each man may have a net at once and have it replaced immediately when damaged. If phlebotomus is known to occur, the mesh should be small—at least 22 holes to the linear inch.

"(2) Some form of standard mosquito-proof hut similar to those used in Salonika in 1918. They were made of wood, canvas, and copper gauze, and can be quickly put together. There should be a definite scale for the supply of these. They can be used as mess-huts for men and officers, and as hospital wards in place of tents, offices, etc. They protect, of course, against flies as well as mosquitoes.

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* In this connexion a paragraph from James' most interesting and opportune book on malaria ("Malaria at Home and Abroad," p. 199) is of interest:—

"Perhaps we must make allowances for the frailty of man as well as for the wiliness of the mosquito, but whether this is true or not, practical experience is to the effect that it is usually best to concentrate all available effort on one carefully selected method which can then be brought to a high degree of perfection."

"(3) Copper gauze to mosquito-proof buildings.

"These are far and away the most important, though minor appliances should not be forgotten. Such are:—

"(4) Mosquito boots, especially for officers and sisters.

"(5) Mosquito veils and gloves. The value of these is very limited.

"(6) Special clothing for the men, as, for example, turn-down shorts.

"(7) Some form of mosquito swat to enable men to kill any mosquitoes found in the rooms or tents in the morning.

"(8) Repellents, though these are of very limited use.

"(9) Sprayers and fumigators.

"(10) Pamphlets of a simple kind explaining the dangers of the mosquito and the reasons for the measures taken.

"In addition, there should be a staff consisting of experts whose sole duty it is to report at once on the malaria incidence and dangers in the various districts to be occupied and to suggest measures of prevention."

As already stated *A. maculipennis* and *A. superpictus* were the main carriers of infection. Both species hibernated as adult females, though from the fact that larvae of the first-named species can withstand being frozen in a block of ice the possibility of hibernating in the larva stage is conjectured. Hibernation is not synonymous with dormancy, since wintering females will feed if their shelter at any time becomes warm enough. Both species were about equally readily infected both with *Plasmodium vivax* and *P. falciparum*. The percentage of captured insects found to be naturally infected, even at the height of the malaria season, was only 1·5 per cent. The earliest discovery of a naturally infected *A. maculipennis* was May 11th, in the Struma valley; but at Lahannah seven individual *A. superpictus* were captured in winter with oocysts of quite normal appearance in the stomach-wall. This discovery re-opened the question of the possibility of malarial infection being carried from season to season, in a latent form, by hibernating mosquitoes; a question that was afterwards settled in the conditional affirmative by subsequent experiment, the proviso being that the winter temperature of the sheltering place must not be too low—for when mosquitoes with unripe cysts of *P. falciparum* were kept in the ice-chest for some days at a temperature constantly but a few degrees above freezing-point and were then restored to suitable warmth the cysts in all cases failed to ripen, but when such insects were kept at the ordinary winter temperature of the laboratory for 14 days the cysts developed after the insects were replaced in the incubator.

All the three familiar species of malaria parasites were met with in Macedonia; but the quartan parasite, though quite common among the native children was exceedingly rare among the troops. In the tabulated records of blood-films *P. vivax* and *P. falciparum* infections were about equal in number towards the end of the year (November); thereafter the number of *P. falciparum* fell and the number of *P. vivax* rose until March–May, when over 98 per cent. of the films showed *P. vivax*.

Colonel Wenyon offers a very simple explanation of the late seasonal appearance of *P. falciparum*. He argues that since the infection with *P. vivax* persists and relapses, while that with *P. falciparum* does not, there must be, at the very commencement of the malaria season, more human carriers of *P. vivax* than of *P. falciparum*, and consequently a preponderating infection of active mosquitoes with *P. vivax*, manifested by a corresponding preponderance of benign tertain admissions. Cases of *P. falciparum* infection, however, do occur as early in the season as May; but now, however, the facts must be taken into consideration (1) that gametocytes of *P. vivax* are much more vulnerable by quinine than gametocytes of *P. falciparum*, and (2) that *P. falciparum* in man produces gametocytes more quickly and abundantly than *P. vivax*; consequently as the malaria season progresses an increasing number of active mosquitoes must become infected with *P. falciparum*, and this will at last be manifested in a preponderant number of malignant tertian admissions.

The severity of malaria in Macedonia is not different from that of other malarious countries; primary infections also may be long latent; blackwater fever also is not uncommon, and Colonel Wenyon takes occasion to emphasize his opinion that, fundamentally, blackwater is a particularly extreme manifestation of that destruction of red blood cells which is the characteristic feature of malaria infections in general.

In discussing the morbid histology of malaria, Colonel Wenyon draws attention to two distinct types of fatal cerebral phenomena, though he does not assume that they are distinguishable clinically; in one class of cases the capillaries of the brain (and viscera also) are completely blocked by embola of infected cells, in the other class the capillaries are obstructed but are still to some extent permeable and among the obstructive cells few seem to be infected. He also, apropos morbid histology, makes some remarks on intramuscular injection of quinine. Here, while admitting the inevitable necrosis, and allowing that this interdicts the routine practice of the method, he concedes the point that since the after effects of necrosis are not necessarily serious there are cases where, when the administration per os fails to control fever, an intramuscular injection is permissible.

One of the most important and most informative sections of Colonel Wenyon's contribution—a section particularly instructive in all details of technique—contains an account of his various observations on the development of malaria parasites in infected Anopheles and of his experiments to determine certain conditions that influence development. This section is very fully and clearly explained by figures.

Major Greig Anderson contributes some valuable observations on the treatment of malaria, particularly treatment designed to prevent relapses in benign tertian. The standard of a relapse, in these observations, is defined as a rise of temperature to at least 100° Fahr. together with the detection of parasites in a blood film. The standard for measuring the results of a given line of preventive treatment was afforded by 44 cases specifically treated only during the continuance of any actual relapse that might occur during the term of observation, but otherwise only receiving a simple iron tonic mixture.

Underneath the working of all the methods of treatment tested there was observed in benign tertian infections a natural bias to remain quiet during the off season, and to revive—quite apart from any probability of re-infection—during the malaria season. Major Anderson, therefore, emphasizes the proviso that the effects of different lines of treatment are comparable only for cases of the same type treated at the same place and at the same season of the year. Within this proviso it appears from the table of results (see this *Bulletin*, Vol. 19, p. 295) that there was not a great deal to choose between the different methods of treatment tested.

A section, mainly on the investigation of the blood in malaria, is contributed by Captain Kenneth McLay. Its conclusions, though not altogether novel, are well worth quoting, as follows:

"The principal aim in the haematological work of the Malaria Inquiry Laboratory in Salonika was to obtain evidence of the efficacy of the various modes of administering quinine in malaria. The results attained are in favour of the administration of the drug by the mouth as opposed to the intramuscular route in the treatment of the ordinary case of malaria, that is, the case where quinine is tolerated by the alimentary canal. Some evidence has been obtained that the malarial parasite disappears more rapidly from the blood by oral than by intramuscular administration of quinine. The subcutaneous method gives similar results to the intramuscular.

"The great objection to the intramuscular injection is the intense reaction, sometimes amounting to abscess formation, and discomfort which it produces in the patient. These are not justified unless some compensation is afforded in the way of more effective destruction of the parasite, of which there is no evidence. This method should be reserved entirely for cases where the oral route is impossible.

"Four-hourly observations upon the asexual benign tertian cycle appear to show that quinine has an immediate effect upon the malarial parasite, not only upon the young sporulating merozoite but also upon the intracorpuscular stage.

"Sporulation of the parasite in a single infection of benign tertian malaria seems not to be limited merely to the actual time of rigor but to be spread over a period of a few hours, with a wave-like rise during the rigor. In the case of a double benign tertian infection the sporulation seems to be continued throughout the whole cycle, with the same wave-like increase at the time of rigor.

"The cultivation of the malarial parasite *in vitro* is very uncertain and appears to be adversely influenced by the presence of quinine in the body.

"The large mononuclear leucocytes seem to be greatly attracted by the malarial parasite, in whose destruction they probably play an important part.

"The leucocyte count is of undoubted value in the diagnosis of malaria, but a careful, and if necessary, prolonged search for parasites must not be neglected.

"No evidence has been obtained that there is any increased fragility of the red blood corpuscles in malaria.

"Investigations carried out amongst Macedonian school children point to an extreme endemicity of malaria in the native population and a peculiar prevalence of the quartan type of the disease not found amongst the British troops."

Captain T. S. Hele provides a valuable contribution on the urinary excretion of quinine, in which he describes and criticises laboratory methods, and follows the excretion of quinine in a healthy individual, in cases of malaria after a single dose of quinine, and in cases under courses of quinine. The following is a summary of his investigations:—

"(1) The picric acid method for estimating quinine is sufficiently accurate for a clinical laboratory. It can be used with advantage when the apparatus is limited.

"(2) In health quinine is eliminated more rapidly after oral than after intramuscular administration (one case).

"(3) The excretion rate of quinine in health shows no great fall from the second to the twelfth hour after an oral dose, from the fourth to the eighteenth hour after an intramuscular dose, and from the second to the twelfth hour after an intravenous dose. It is suggested that the quinine concentration in the blood is relatively constant over the same periods (one case). The excretion rate of quinine falls off rapidly after the first day. Elimination may continue for ninety-six hours.

"(4) The excretion rate of quinine in malaria is similar to that in health, but there is greater variation, as would be expected, after oral administration.

"(5) In cases of malaria the excretion of quinine shows individual variations, but in the series quoted there is no constant difference observed under different forms of therapy. The amount recovered from the urine varied from ten to thirty per cent. of the administered dose.

"(6) There is no evidence of any decrease of quinine elimination during a course of treatment.

"(7) The excretion of quinine in five cases of blackwater fever was only a little less than normal. In a sixth case the excretion of quinine was less than half the normal. All these cases were passing a fair volume of urine and recovered.

"In a seventh case where there was suppression of urine for three days only traces of quinine were found in the urine removed from the bladder post mortem. There were forty milligrammes of quinine in the liver of this case.

"(8) The faeces of all cases given in this report were examined for quinine. Only traces were detected."

In an after note Captain Hele draws attention to a blue pigment frequently encountered in the urine of patients taking quinine, with the object of enlisting the attention of other workers to its nature and significance.

The final contribution, by Captain J. Waterston, contains an account of the mosquitoes collected in Macedonia. These included 26 species and two varieties. Among them, besides *Anopheles maculipennis* and *A. superpictus*, stigmatized by Wenyon as the principal malaria carriers, were *A. bifurcatus*, *A. algeriensis*, *A. plumbeus*, *A.* " *hyrcanus* " (better known as *A. sinensis*), and *Stegomyia fasciata*.

In conclusion it must be mentioned that the abstracts already published in this Bulletin (see above, and particularly Vol. 18, pp. 326–327, and Vol. 19, pp. 277–278) include much interesting detail that it has not been thought necessary to notice in a review of general lessons and conclusions.

A. Alcock.

SCHILLING (Victor). **Das Blutbild und seine klinische Verwertung (mit Einschluss der Tropenkrankheiten). Kurzgefasste technische, theoretische und praktische Anleitung zur mikroskopischen Blutuntersuchung.**—pp. viii + 171. With 3 lithograph plates, 28 text figs. & 190 haemograms.* 1922. Jena: Verlag von Gustav Fischer. [Price 170 mks.]

It is eight years since we had the opportunity of reviewing Schilling's contribution to haematology in his " Ausgewandte Blutlehre für die Tropenkrankheiten " (see this *Bulletin*, Vol. 3, pp. 567-570), written specially from the point of view of tropical disease.

The work now before us fulfils a more ambitious purpose, for it describes the application of the haematology to the practice of medicine, setting forth the manner in which the microscopic study of the blood can aid diagnosis and direct treatment. Schilling argues that scientific haematology should not be regarded as a special cult, but as part of the *armamentarium* of the doctor, and as of equal value with auscultation, percussion, and urinalysis. The subject naturally divides itself into several portions. The first concerns itself with physiochemical problems—the agglomeration of the corpuscles, clotting of the blood, and so forth. Then follows a description of the technique of staining methods, etc.; special attention being paid to the preparation of thick blood films and the dark-ground illumination as of particular value in the diagnosis of trypanosome and spirochaetal infections. The practical estimation of the various blood elements in all aspects of the subject receives careful consideration; even the recently-described "haemoclastic crisis" of WIDAL is included, though considered as of doubtful value.

The author's differential table for leucocyte counts is figured and described; this idea is an extremely practical one, and we gather that leaflets, on which the various types of leucocytes are illustrated, are on sale in Germany, being much in demand in that country. As regards the estimation of haemoglobin, Schilling concentrates on Sahli's haemometer, and has little praise for rough-and-ready methods, such as the Tallquist scale.

The second portion—an exposition of the theory, morphology, and classification of the blood-picture—is minutely elaborated. With regard to the exact value to be attached to leucocytosis, we are pleased to note that a word of warning is sounded, to regard only definite deviations from the normal as of any positive value, but due consideration, from an academic point of view, has to be given to variations due to muscular contractions, digestion, and even posture (ELLERMANN).

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* The term haemogram is applied in this work to features of the blood-picture which are of definite clinical value.

Attention is directed to the practical application of the "Arneth count," to which Schilling attaches an import not generally recognized in the country. It is well known that in septic and toxic infections the immature forms of polymorphs are present in numbers in the blood-stream; the nuclear transitions which these leucocytes undergo, according to degree of maturity, is set forth in an elaborate table, in which the more complex segmented nuclei are ranged on the right-hand side, while the less complex, "sausage-shaped" nucleated forms are on the left. Not less than 80 polymorph cells should be counted and classified in this wise, in order to obtain information of real value. Deviation of the index "to the right" takes place in chronic diseases, such as scurvy, beriberi, sprue, pernicious anaemia, etc. Deviation of the index "to the left" can be subdivided into a "regenerative" and a "degenerative" picture; by these terms we are given to understand that in the first type the predominant polymorph is one with embryonic nucleus, and that in extreme cases promyelocytes and myelocytes may also be present.

As an instance of the practical application of the Arneth picture to surgery, a case is quoted (p. 81) in which a patient, after successful operation for appendicitis, suffered subsequently from an obscure pyrexia. The wound had healed, and the general condition of the patient warranted a favourable prognosis, but persistence of leucocytosis (11,000 : neutrophilia 69 per cent.) indicated further abscess formation. Acting upon this information, the surgeon discovered a small collection of pus buried in the wound. After successful evacuation, it was found that the persistent deviation of the Arneth index to the left and the entry of myelocytes into the blood-stream suggested further extension of sepsis and consequently a very grave prognosis. Death took place shortly afterwards from general peritonitis. The shifting of the index to the left is also illustrated in the case of hepatic abscess with a fatal termination.

Degenerative "stabkerniger," that is to say, neutrophiles with a lobed nucleus which has lost the definite segmentations of the fully-developed polymorph, occur in fevers, such as typhus, pappataci, kala azar, and sometimes tuberculosis. In this condition, unless there is relative lymphocytosis, a general reduction of leucocytes, or a leucopenia, is the rule. The opinion is expressed that probably one estimation of the Arneth index is of little value, but that the plotting out of a curve from daily observation will probably come to be regarded as of definite symptomatic and prognostic value. In order to compute and compare the leucocyte-counts, tables, designated "haemograms," should be compiled with separate columns for the total leucocytosis, basophiles, eosinophiles, myelocytes, young "stabkerniger" and highly segmented polymorphs, lymphocytes, and monocytes (mononuclears). Considerable value is attached to the diagnostics of a lymphocytosis; apart from a physiological rise in the cells, a *pathological* rise occurs in mumps, pertussis, and after administration of adrenalin. The rise in the mononuclear leucocyte (monocytosis) is very briefly considered. The author concludes that this type of cell is most abundantly produced in infections of moderate virulence, but with a tendency to periodic exacerbations, such as protozoal infections (malaria, kala azar, trypanosomiasis), and malignant endocarditis, etc. The question of its exact diagnostic or prognostic value in malaria is not elaborated.

The types of leukaemia and study of the blood-picture in childhood receive consideration.

The third portion of the volume is devoted to the clinical application of the subject-matter already described, and appears to the reviewer merely a needless elaboration and rather tiresome reiteration of technicalities. The demonstration and morphology of blood parasites is very briefly described in 10 pages! The three coloured plates which illustrate this work reach the high standard we have been led to expect from Schilling's former publications, and we may note that they are the work of the same artist.

In conclusion, we are confident that this work fulfils a distinct and useful purpose, appealing especially to the practitioner in the tropics who is constantly dealing with abnormalities of the blood. Whether the finer variations in the blood-picture, or the more minute changes in the leucocytes, are of such definite practical importance as the author of this work would indicate is an open question. At any rate, the "personal equation" enters so much into a computation of this nature that all aspects of a clinical case should be regarded in due perspective, without attaching too much importance to variations in the curves of purely artificial indices.

P. H. Manson-Bahr.

STITT (E. R.). [A.B., Ph.G., M.D., Sc.D., LL.D.] **The Diagnostics and Treatment of Tropical Diseases.** Fourth Edition, Revised. With 159 Illustrations. 1922. London: H. K. Lewis & Co., Ltd. [Price 18*s*. net.]

Surgeon-General Stitt is well known to all students of tropical medicine as the author of two books which have established themselves definitely in public favour. The volume under review, which now appears in the fourth edition, has been considerably revised and expanded. All the various conditions included under tropical diseases are dealt with, and the information given is accurate and up-to-date. Where so much is compressed into such a relatively small space, it is inevitable that the book should be written somewhat in the abbreviated style of a note-book; but the note-book is a very good one, and no points of any importance are left untouched. Indeed, the chief characteristics of the work are conciseness, accuracy and modernity.

The section on the treatment of malaria is excellent, but those on the treatment of some of the other diseases (notably cholera) are rather inadequate.

Although seven pages are given to the etiology of beriberi, which contain a great deal of information, it is doubtful whether anyone, reading the subject here for the first time would be able to form any clear idea of the probable causes of the disease; the views of many authors are given but little or no attempt is made to discriminate between them. Chapter VI. contains an account of WEIL's disease (infectious jaundice), but it is impossible to deal adequately with this subject in the very small space that has been allotted to it. A new chapter has been added on rat-bite fever, and another on tularaemia. The latter contains a very readable description of this newly-recognized disease.

Part II., on the "Diagnostics of Tropical Diseases," can be unreservedly commended. It contains an excellent, short account of the cosmopolitan diseases and the modifications which are seen in the tropics, with brief paragraphs on disturbances of the endocrine secretions, and on focal sources of systemic infection.

Another instructive chapter deals with the importance of due consideration of the mode of onset of the disease, and of the temperature chart, in diagnosis. The author rightly lays stress on the difficulties which attend the use of the clinical thermometer in conditions of high atmospheric temperature; and points out the precautions that should be taken to ensure accurate records. Much information is given on blood-examination; on the examination of the circulatory, respiratory and lymphatic systems; on jaundice, the faeces, the joints, the bones, the skin; and on diseases of the nervous system.

The illustrations, on the whole, are good, but they are of somewhat unequal merit. It would be a decided improvement if the scale of magnification were given in all (as it is in some) of the figures of insects, worms and protozoa.

Considering the limitations of space imposed by the small size of the book, the reviewer considers that too much has been attempted. This book is certainly not one for a novice in tropical diseases; the matter is so concentrated that a reader to whom the subject was new would be liable to suffer from intellectual indigestion. But practitioners in the tropics, advanced students, and those preparing for examinations, will find it very useful as a thoroughly reliable guide for the purpose of a rapid revision of their knowledge.

H. J. Walton.

VACCAREZZA (Raul F.), INDA (Francisco F.) & POSSE (Rafael). **Tratamiento del carbunclo humano.** [Treatment of Anthrax in Man.] —Reprinted from *La Semana Médica*. 1922. Nos. 22, 23, 24, 25 & 26. 359 pp. With 121 text figs. & 7 tables. 1922. Buenos Aires: Imp. de Obras de E. Spinelli, 2254—Córdoba. [Price not stated.]

An account of 204 cases of anthrax in man treated in various ways, 198 being cases of " malignant pustule " and the rest " malignant (anthrax) oedema." In 167 the bacillus was obtained direct from the serum of the pustule, and in 171 by culture from the fluid.

The following methods of treatment were adopted in different series of cases:—

1. With *normal bovine serum* in doses of 30–50 cc. once or twice a day in cases of average severity. Fifteen were so treated, and the conclusion was reached that the previous favourable reports were too sanguine, though the preparation was certainly as useful in this disease as was specific serum. Experimental work with animals had also led the authors to conclude that neither for prophylaxis nor in treatment is normal serum as efficacious as that of animals immunized with the bacilli.

2. With *Pyocyanase* and *Pyocyanin*. The former of these is the name given to cultures of some three weeks old, reduced to one-tenth by evaporation *in vacuo*, treated with ten times the weight of alcohol and filtered; Pyocyanin is the filtered products of cultures of *B. pyocyaneus* heated to 70° C. for an hour. Ten to twenty cc. were injected subcutaneously in the neighbourhood of the lesion, and, if necessary, repeated in a few days. This method was not tried in a sufficient number of patients for reliable conclusions to be drawn, but the impression obtained was that the results were not so good as with specific serum.

3. Injection of *Peptone* (generally 5 per cent.) intramuscularly in dose of 30 cc. daily, or, in some instances, twice in the 24 hours. Forty-three patients were thus treated, and full details are given of each case. Four terminated fatally. The results obtained were as good as those with normal or specific serum.

4. *Antiserum of Mendez*. Average dose 15–20 cc. intravenously. Of the 56 treated 11 died.

5. Specific *D.N. de H. serum* (Departamento Nacional de Higiene). Twenty-four cases with two deaths.

6. Eleven patients received symptomatic treatment only. One of these died practically at the moment of entrance to hospital, and another from tetanus within a few hours. The remainder recovered.

A combination of forms of treatment was employed in 32 cases.

The final conclusion of the writers of this record is that peptone gives as good results as any of the sera employed, and that specific is very little superior to normal serum.

H. Harold Scott.

AUSTEN (E. E.) & HEGH (Emile), with a Preface by the Earl Buxton. **Tsetse-Flies. Their Characteristics, Distribution, and Bionomics, with Some Account of Possible Methods for their Control.**—188 pp. With 5 plates & 19 text figs. 1922. London: Imperial Bureau of Entomology, 41, Queen's Gate, S.W.7. [Price 7*s.* 6*d.* net.]

This encyclopaedic dissertation appears to contain all that is known about tsetse-flies, the first chapter showing by clear figures and explanations how they can be distinguished from all other flies, and the last leading to the points whence further study of their bionomy should be continued. Between the initiation and the goal of graduation as an independent observer, the neophyte is taken through seventeen stages, in which the following particulars are fully expounded:—

The distinctive characters and the geographical distribution of the several species. The facts and circumstances of reproduction, gestation, and post-embryonic development, and the places and season of breeding. The peculiarities of habitat of the several species. Their bionomy. The nature of their food and the manner and times of their feeding. Their preferences as predatory parasites, and their relations to small animals of various classes, to big game, and to trypanosomiasis. Circumstances in their physical environment by which they are influenced. Their competitors and predatory enemies and their parasites. The different measures by which they may be destroyed, incommoded and circumvented with a view to their control and subjection by man. Instructions for collecting and preserving them, for breeding and keeping them alive for experimentation, for dissection, for graphically recording their distribution, and for studying them and their habits. Then there is a most valuable bibliography containing more than 170 references to original observations. There are also, besides 19 figures in the text, three exquisite plates of the commoner species, and two plates of typical breeding-places.

The entire collection of solid fact is presented clearly and with fastidious accuracy. On page 96, however, the statement that trypanosomes have not been recorded as occurring in the blood of the elephant and the hippopotamus requires reconsideration.*

A. Alcock.

WATERSTON (James). **The Louse as a Menace to Man: Its Life-History and Methods for its Destruction.**—*British Museum (Natural History) Economic Series No. 2.* 20 pp. With 1 plate & 2 text figs. 1921. London: Printed by Order of the Trustees of the British Museum. [Price 6*d.* net.]

This pamphlet is intended to replace "The Louse in its Relation to Disease" by the late Mr. Bruce CUMMINGS, which is now out of print. It consists of three sections, the first of which deals with the life-history and habits of the crab-louse and head and body lice, the second with lice in relation to disease, and the third with methods for destroying lice. It is well and clearly written, and contains in a concise form all the information required by a medical officer.

The only questionable particular in its admirable survey is the adoption of the view that overlooks, on the one hand, the affinities between bugs and lice, and, on the other hand, those—so well illustrated by the parasitic

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* *Sleeping Sickness Bulletin,* No. 11, p. 436; No. 26, p. 173. The paper by BRUCE and colleagues on a trypanosome of the African elephant was reprinted in the *Sleeping Sickness Reports of the Royal Society,* in which the authors have overlooked another reference of historical interest (Rep. No. 9 (1908), pp. 45–48), also cited in the *Sleep. Sick. Bull.* (No. 3, p. 117.) under HODGES. Here, indeed, are several references, appended to an article summarizing the knowledge of *Glossina palpalis* at that date (1909), which are not found in the present book.—[ED.]

Hemimerus—between Mallophaga and Orthoptera, and fixes on the Mallophaga as the most intimate relatives of the blood-sucking lice. The matter, of course, is not of much importance in a treatise having a purely economic intention.

A. Alcock.

LAING (Frederick). **The Cockroach: Its Life-History and how to deal with it.**—*British Museum (Natural History) Economic Series No. 12.* 18 pp. With 1 plate & 2 figs. 1921. London: Printed by Order of the Trustees of the British Museum. [Price 6*d*.]

Cockroaches are insects that arouse the justifiable suspicion of the sanitarian, who will be glad of this budget of useful information about their habits and about the approved methods of destroying them. Three species have become affiliated to man, namely, *Blatta orientalis*, commonly known as "black beetle," *Periplaneta americana*, the large reddish cockroach, and *Blatella germanica*, the little misnamed "german" cockroach. There is a fourth domestic species, *Periplaneta australasiae*, the Australian cockroach, distinguished by the presence of a yellow ring within the margin of the first thoracic segment and a yellow dash on the sides of the wing-covers, which is not nearly so intimate with man as the other three.

The author informs us that in this country—where, however, growth is probably retarded by the unkind British climate—*Blatta orientalis* takes about five years to attain the dignity of an adult. *Blatella germanica*, however, reaches sexual maturity in considerably less than a year, and *Periplaneta americana* is stated to become full-grown in America within a year.

The particular poison recommended by the author is a mixture of three parts of sodium fluoride and one part of pyrethrum powder; but sweetened borax powder, and a mixture of one part of plaster of Paris and two parts of sugar are also known to be efficacious. The powders are scattered about the insects' haunts at night. Properly baited traps are also very useful. [The reviewer has permanently exterminated cockroaches from a badly-infested house by the continuous use, through one summer, of a "Demon" trap.] Where cockroaches are so numerous as to necessitate the employment of fumigation with sulphur, the author's recommendation is that 2 lb. of sulphur per 1,000 cu. ft. is necessary. The author also mentions carbon bisulphide [but it is a dangerous thing to use]. In premises where steam-pipes are fitted a sustained temperature of 130° F. is fatal to cockroaches.

A. Alcock.

BRITISH MUSEUM (Natural History). **A Guide to the Domesticated Animals (other than Horses) exhibited in the Central and North Halls of the British Museum (Natural History), Cromwell Road, London, S.W.** Third Edition. 56 pp. With 25 figs. 1918. London: Printed by Order of the Trustees of the British Museum. [Price 1s.]

The book in its present form is merely a new impression, with one or two unimportant corrections, of the second edition published in 1912, which was revised and brought up to date by the original author, LYDEKKER. It is a commentary on the exhibits (other than horses], which include various breeds of cattle, buffaloes, sheep, goats, pigs, dogs, and cats, as well as the llama and alpaca, ferrets, guinea-pigs, rabbits, rats and mice, pigeons, poultry, ducks and geese, and canaries.

The interest of the exhibits, which illustrate the wonderful plasticity of organisms and the remarkable modifications that can be established under domestication, and the interest of this well-illustrated guide-book, are perhaps even more manifest to the medical profession than they are to the educated public.

A. Alcock.

ROCKEFELLER FOUNDATION. **International Health Board. Eighth Annual Report, January 1, 1921-December 31, 1921.** [ROSE (Wickliffe), General Director.]—pp. xvii + 168. With 62 text figs. 1922. New York: 61, Broadway, U.S.A.

Of the contents of this interesting report those that have a particular reference to diseases most prevalent under tropical conditions will command our attention. Of these ankylostomiasis may be taken first, if only for the reason that, individually, it is the bulkiest ingredient of the report and its appendix.

As regards hookworm, then, we learn that the Board, having extensively demonstrated that this disease can be controlled, and shown how that control can be acquired and maintained, is inclined, so far as countries near home are concerned, to leave its well-bought experience as a lesson for general application in this and other directions by local authorities. In far-off countries, however—Mauritius, Ceylon, Madras, Siam, Borneo, and several parts of the Australian region—fresh surveys and propaganda have been started.

Against yellow fever the fields of action have been Peru, Mexico, and British Honduras, and the object of attack has been the Stegomyia larva, though vaccination with killed cultures of the *Leptospira icteroides* has been practised also in all three areas. In the local circumstances the most efficient method of dealing with the Stegomyia larva is stocking all domestic water-vessels with small fish; these were distributed at the rate of 2–4 for vessels of 10–15 gallons capacity. The efficacy of the Noguchi vaccine was strikingly illustrated in two local epidemics, in each of which 200 vaccinated persons entirely escaped attack. Attention is directed to two instructive maps, comparing the hold of yellow fever on the Western Tropics in 1900 and in 1921.

It may be remembered that in 1920 the Board sent a yellow fever commission to West Africa, which, though it did not detect any existent case, found strong evidence of active infection in recent years.

Operations for control of malaria have been extended in the southern States and also to Nicaragua. In small towns and farmsteads the top-minnow has demonstrated its efficacy against Anopheles. Control by quinine treatment of human carriers has also been tested with favourable results.

The Appendix, compiled from special articles already published or in manuscript, contains much valuable information on the incidence of hookworm in Madras and in the Australian region; on the extra-corporeal life of the hookworm; on the relation of fowls and pigs to the spread of the worm; on the effects of salt-water on its eggs; and on methods of diagnosis of infection; and an interesting diagram illustrates how hookworm tends to become gradually reduced if risk of reinfection is limited. It also contains details of various antimosquito measures, including the employment of fish in reducing Anopheles larvae.

Frequent recurrence of a confident militant note in this report reminds us once more of the formidable austerity of the resolute sanitarian.

A. Alcock.

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The bracketed abbreviations after the page numbers indicate the subject. Page numbers within brackets indicate papers not summarized.

Am.	signifies	Amoebiasis and Amoebic Dysentery.
Bb.	„	Beriberi
Bl.	„	Blackwater
B.R.	„	Book Review
Chl.	„	Cholera
Der.	„	Tropical Dermatology
Dys.	„	Dysentery (Bacillary and Unclassed)
Ent.	„	Enteric Fevers
Fev.	„	Fevers
Hel.	„	Helminthiasis
H.S.	„	Heat Stroke
Jaun.	„	Infectious Jaundice
K.A.	„	Kala Azar
Lab.	„	Laboratory Methods
Lep.	signifies	Leprosy
Mal.	„	Malaria
Misc.	„	Miscellaneous
Oph.	„	Tropical Ophthalmology
Pel.	„	Pellagra
Pl.	„	Plague
R.F.	„	Relapsing Fever
Sc.	„	Scurvy
Sp.	„	Sprue
S.S.	„	Sleeping Sickness
Tb.	„	Tuberculosis
Und.	„	Undulant Fever
Ys.	„	Yaws
Y.F.	„	Yellow Fever
Z.	„	Medical Zoology

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——, & Young, W. A., 822 (Z.)
Connal, S. L. M., with Connal, A., 654 (Hel.)
Connor, F. P., & Shortt, H. E., 552 (K.A.)
Connor, M. E., 112 (Z.)
Connor, R. C., 327 (Am.)
Conran, P., 129 (S.S.)
Conseil, E., & Gérard, F., 866 (Mal.)
——, with Nicolle, 742 (Und.)
Cooley, R. A., 118 (Z.)
Coonoor, Pasteur Institute, 524 (Misc.)
Coppin, H., 68 (Fev.)
Coppinger, F. R., & Robertson, R. C., 698 (Dys.)
Cordeiro, F. P., 352 (Und.)
Cordey, with Courcoux & Lelong, 746 (Und.)
Corfield, C. R., & Hirson, B., 659 (Hel.)
Cornick, B., 407 (Tb.)
Cornwall, J. W., 317 (K.A.), 524 (Misc.)
——, & La Frenais, H. M., 304 (K.A.), 618 (Misc.)
Correa Afonso, P., with de Mello, 846 (Z.)
Corson, J. F., 67 (Fev.)
Cort, W. W., 198 (Hel.)
——, Augustine, D. L., & Payne, G. C., 664 (Hel.)
Corvetto, A., (672) (Hel.)
Courcoux, A., Lelong, M., & Cordey, 746 (Und.)
Courrier, R., with Chatton, 151 (S.S.)
Couvy, L., 66 (Fev.)
Cowgill, G. R., 414 (416) (Bb.)
Cox, H. V. W., 799 (Misc.)
Cragg, F. W., 490 (Z.), 555 (R.F.)
——, with Christophers, 492 (Z.)
Craig, C. F., 462 (Z.)
Cram, E. B., with Ransom, 234 (Hel.)
Crawford, W., 377 (Chl.)
Creighton, C., Wagner, C. E., & Davison, W. C., 42 (Dys.)
Cremonese, G., 289 (Mal.)
Crendiropoulo, M., 741 (Chl.)
Crichlow, N., 34 (Dys.), 169 (Der.), 344 (Bl.), 612 (Misc.), 661 (Hel.)
di Cristina, G., 319 (K.A.)
Croley, V. St. J., 847 (Z.)
Cross, H. E., & Patel, P. G., 873 (S.S.)
Cross, K. S., 208 (Hel.)
Crowell, B. C., 236 (Hel.)
Crutchfield, E. D., with Boyd, 165 (Der.)
Csernel, E., 340 (Dys.)
Cuba, 809 (B.R.)
Cuénod, A., with Nicolle, 59 (Oph.)
Cumming, H. L., 169 (Der.)
Cummins, S. L., 179 (Tb.)
Cumston, C. G., 708 (Oph.)
da Cunha, A. M., & Julio Muniz, 820 (Z.)
Cunliffe, N., 492, 844 (Z.)
Curasson, 596 (Der.)

D

Dakeyne, D. I., 243 (Hel.)
Daleppa, K., (349) (Bl.)
Damianovich, H., 414 (Bb.)
Danysz, J., 42 (Dys.)
Darling, S. T., 241 (Hel.), 288 (Mal.)
——, & Smillie, W. G., 247, 249 (Hel.)
Dartigolles, R., 840 (Z.)
Daumas, A., with d'Œlsnitz & Balestre 550 (K.A.)
Davey, J. B., & Newstead, R., 475 (Z.)
David, J., 871 (Mal.)
Davies, L. W., & Johnson, W. B., 67 (Fev.)
Davison, W. C., 35, 695 (Dys.)
——, with Creighton & Wagner, 42 (Dys.)
——, with Josephs, 337 (Dys.)
Dawe, M. T., 836 (Z.)
Dawson, P. R., with Sullivan, 426 (Pel.)
Dawson, W. S., & Moodie, W., 39 (Dys.)
Debray, J., with Goyon, 694 (Dys.)
Decrop & Salle, 174 (Der.)
Defiel, F., 842 (Z.)
Degouillon, with Montpellier & Lacroix, 172 (Der.), 229 (Hel.)
Delamare, G., 375 (Pl.), 741 (Chl.)
Delangen, (763) (Bb.)
Delanoë, P., 107 (Z.), 153 (S.S.), 842, 845 (Z.)
de la Pouge, 347 (Bl.)
Delater, G., with Rieux, 859 (Mal.)
Delbreil, P., 730, 734 (Pl.)
Delf, E. M., 418, 764 (Sc.)
del Ponte, E., 118 (Z.)
Deschiens, R., 463 (Z.)
des Ligneris, M. J. A., 208 (Hel.)
Detzner, H., 612 (Misc.)
Dew, H. R., 329 (Am.)
——, & Fairley, N. H., 47 (Dys.)
——, with ——, 288 (Mal.)
Diacono, B., & Moreau, R., 204 (Hel.)
Dimitry, T. J., 62 (Oph.)
Diogo, H. C., 241 (Hel.)
Dionisi, A., 292 (Mal.)
Dios, R., & Oyarzábal, J., 157 (S.S.)
Dive, G. H., with Kennedy, J. C., 386 (Ent.)
Dodd, S., 493 (Z.)
Dodds, A. B., 403 (Tb.)
Doerr, R., & Kirschner, L., 298 (Mal.)
Doi, Y., with Umeno, 523 (Misc.)
Do-Kin, C., with Kojima, 173 (Der.)
Dold, H., & Chen Yühsiang, 338 (Dys.)
Dollfus, R. P., (672) (Hel.)
Donaldson, 417 (Sc.)
Donatien, A., & Parrot, L., 886 (S.S.)
——, & ——, with Sergent, Edm. & Et., 280, 870 (Mal.)
——, with Sergent, Edm., 148, 518 (S.S.)
Donatien, A., with Sergent, Edm. & Et., & Lhéritier, 148 (S.S.)
——, with ——, Parrot & Béguet, 315 (K.A.)
di Donizio, G., 147 (S.S.)
Dreyer, F. J. F., 678 (Am.)
Dreyer, G., 772 (Lab.)
Dry, F. W., 798 (Misc.)
Dubin, H. E., with Funk, (416) (Bb.)
Dubois, R., 830 (Z.)
Dubreuilh, W., 174 (Der.)
——, & Joulia, P., 596 (Der.)
Ducas, R., 660 (Hel.)
Dufougéré, W., 160 (Der.)
Dufourt, A., with Weill & Arloing, 761 (Bb.)
Duke, H. L., 123 (S.S.)
Duncan, J. T., with Newham, 797 (Misc.)
Dunn, L. H., 483, 492, 493 (Z.)
——, with Bates & St. John, 320 (R.F.)
Dupasquier, D., with Nicolas & Massia, 423 (Pel.)
Dupérié, R., & Obrenovitch, E., 586 (Mal.)
Duque Lince, E., 658 (Hel.)
Dutcher, R. A., Harshaw, H. M., & Hall, J. S., 420 (Sc.)
du Toit, J. S., 710 (Oph.)
——, with Knuth, 263 (B.R.)
Duzár, J., 864 (Mal.)
Dyson, W., 172 (Der.)

E

Eckman, P. F., 418 (Sc.)
Eckstein, F., 475 (Z.)
Eddy, W. H., Shelow, E., & Pease, R. A., 420 (Sc.)
Edge, B. E., 169 (Der.)
Edwards, F. W., 474, 828, 833 (Z.), 651 (Hel.)
Egypt, 540 (B.R.)
Eijkman, C., 73 (Bb.)
Eisendrath, B., 283, 861 (Mal.)
Elias, P., with Leipoldt & Cleaver, 284 (Mal.)
Elliot, R. H., 721 (Oph.)
Elliott, C. H., 526 (Misc.)
Elliott, T. R., with Macpherson, Herringham & Balfour [Edited by], 800 (B.R.)
Ellis, A. G., 675 (Am.)
Ely, L. W., Reed, A. C., & Wyckoff, H. A., 684 (Am.)
Enneking, J., 681 (Am.)
Epps, W., 629 (B.R.)
Epstein, E., 376 (Pl.)
Epstein, H., 775 (Lab.)

Escomel, E., 159 (Der.)
Eugling, M., 571 (Mal.)
Evans, A. M., 475, 828 (Z.)
——, with Newstead, 117, 490 (Z.)
Evans, H. M., 122 (Z.)
Eyre, J. W. H., & Marshall, C. H., 141 (S.S.)
Ezickson, W. J., 842 (Z.)

F

Fairley, K. D., 670 (Hel.)
Fairley, N. H., 199, 646, 671 (Hel.)
——, & Dew, H. R., 288 (Mal.)
——, with ——, 47 (Dys.)
Falleroni, D., 279 (Mal.)
Falzi, O., 682 (Am.)
Farah, N., 431 (Misc.)
de Faria, J. A., 727 (Pl.)
Fauré, 232 (Hel.)
Faust, E. C., 467 (Z.)
——, & Wassell, C. M., 458 (Z.)
Favre, M., with Nicolas, 799 (Misc.)
Federated Malay States, 111 (Z.)
Ferguson, E. W., 278 (Mal.), 726 (Pl.)
Ferris, 330 (Am.)
Ferris, G. F., & Cole, F. R., 837 (Z.)
Ferro, P., 582 (Mal.), 678 (Am.)
Ferry, G., with Beckerich, 560 (R.F.)
Fiessinger, N., & Blum, G., 746 (Und.)
Fifth Congress of the Far Eastern Association of Tropical Medicine, Singapore, 763.
Fignolini, F., 33 (Am.)
Filho, M., 406 (Tb.)
Filippini, A., (376) (Pl.)
Finochietto, E., & Vaccarezza, R. F., 28 (Am.)
Fischer, W., 25, 331 (Am.), 194 (Hel.)
——, & von Hecker, 788 (Sp.)
Fiske, W. F., 488 (Z.)
Fitz-Gerald, W. E., 37 (Dys.)
Flamerich, C., (300) (Mal.)
Fleck, H. K., 62 (Oph.)
Fleischner, E. C., with Meyer & Shaw, 749 (Und.)
——, Vecki, M., Shaw, E. B., & Meyer, K. F., 350 (Und.)
Fletcher, T. B., 845 (Z.)
——, & Senior-White, R., 888 (S.S.)
Fletcher, W., 385 (Ent.)
——, with Stanton, 617 (Misc.)
Flu, P. C., 225, 653 (Hel.)
Foley, H., & Parrot, L., 166 (Der.)
——, with Sergent, Edm., 321 (R.F.)
——, with ——, & Et., 148 (S.S.)
——, with ——, & Parrot, 478 (Z.)
Fontoynont, M., & Salvat, P., 597 (Der.)
Foot, N. C., 599 (Der.), 843 (Z.)
Forgues, 732 (Pl.)
——, with Thoulon, 734 (Pl.)
de Fossey, M., with Le Noir, 688 (Am.)
Fox, E. C. R., 168 (Der.)
——, & Mackie, F. P., 310 (K.A.)
Fraenkel, E., with Brauer, 293 (Mal.)
França, C., 466, 484 (Z.), 522 (Misc.), 648 (Hel.), 826 (Z.)
——, & Parrot, L., 484 (Z.)
Franchini, F., 677 (Am.)
Franchini, G., 464, 465, 466, 467, 469 (Z.), 519, 520, 887 (S.S.), 825, 826 (Z.)
——, with Roubaud, 821 (Z.)
Francis, E., 442, 444 (Misc.)
——, & Lake, G. C., 442 (Misc.)
——, & Mayne, B., 442 (Misc.)
Francke, 666 (Hel.)
Franco, E. E., 309, 549, 554 (K.A.)
Franke, F., 667 (Hel.)
Freeborn, S. B., 482 (Z.)
Freund, R., with Rosenthal, 888 (S.S.)
Friedemann, U., 861 (Mal.)
v. Friedrich, L., 336 (Dys.)
Frouin, A., & Guillaumie, M., 514 (S.S.)
Fry, A. B., 578 (Mal.)
Fry, A. S., 681 (Am.)
Fukuhara, Y., 43 (Dys.)
Fülleborn, F. 197, 234, 235, (672) (Hel.), 768 (Lab.)
Funk, C., & Dubin, H. E., (416) (Bb.)
Furuichi, T., 328 (Am.)

G

Gabrielides, A., & Guiart, J., 487, 840 (Z.)
Galbraith, J. B. D., 425 (Pel.)
Gale, A. M., 434 (Misc.)
Galli-Valerio, B., 107, 114, (499) (Z.)
Gambier, A., with Marzin, 168 (Der.)
Ganguly, L., 547 (K.A.)
Ganguly, S. K., (715) (Oph.)
Garavaglia, A., (741, Chl.)
Garcia Martinez, A., 702 (Dys.)
Gardner, A. D., 340 (Dys.)
Garnier, 371 (Pl.), 377 (Chl.)
Garraham, J. P., with Acuna, 416 (Bb.)
Gärtner, W., 752 (Fev.)
Gastou, P., 554 (K.A.)
Gauducheau, A., 689 (Am.)
Gedoelst, L., 488 (Z.)
Gei, K., with Kojima, 195 (Hel.)
Genevrier, 583 (Mal.)
de Gennes, L., with Joltrain, 376 (Pl.)
Genovese, F., 588 (Mal.)
Gérard, F., with Conseil, 866 (Mal.)
Gerbasi, E., 747 (Und.)
Gerstmann, J., 580 (Mal.)
Ghosh, N., 603 (Der.)
Gianfranco, C., (300) (Mal.)
Gibbon, E., with Chalmers, 174 (Der.)

Giblin, W. E., 170 (Der.)
Giemsa & Halberkann, with Mayer & Zeiss, 879 (S.S.)
Gildemeister, E., 381 (Chl.)
Gill, C. A., 555 (R.F.)
Gioseffi, M., 284, 578 (Mal.)
Girard, 200 (Hel.)
de Gironcoli, F., (672) (Hel.)
Givens, M. H., McClugage, H. B., & van Horne, E. G., 419 (Sc.)
Glaser, F., 299 (Mal.)
Gläser, H., 659 (Hel.)
Glaser, R. W., 821 (Z.), 886 (S.S.)
Gobert, E., 369 (Pl.)
——, with Nicolle, 204 (Hel.)
Godillon, 863 (Mal.)
Godoy, A., & Pinto, C., 856 (Mal.)
Goèré, R., 341 (Dys.)
van Goidsenhoven, C., with Broden, 149 (S.S.)
Goldberger, J., & Tanner, W. F., 423 (Pl.)
Goldsmid, J. A., 789 (Sp.)
Gomes, J. F., 120 (Z.)
Gomes, J. M., 161, 162 (Der.)
Gonçalves, N. B., 167 (Der.)
González, E., with Iturbe, 324 (R.F.), 602 (Der.)
Goodey, T., 245 (Hel.)
Goodman, H., with Parounagian, 602 (Der.)
Gordon, R. M., 662 (Hel.)
——, & Young, C. J., 111 (Z.)
Goré, S. N., 82 (Misc.)
——, with Malone, 81 (Misc.)
von Gottberg, J., 197 (Hel.)
Gougerot & Ruppe, 394 (Lep.)
Gouillon, P., with Montpellier, 164 (Der.)
——, with Sergent, Et., 227 (Hel.)
Gouzien, P., 370 (Pl.)
Goyon, A., & Debray, J., 694 (Dys.)
de Goyon, J., 370, 734 (Pl.)
de Goyon & Le Vilain, 168 (Der.)
Graham, E. N., (672) (Hel.)
Graham, G., 49 (Dys.)
Graham, J. D., 243 (Hel.)
Graham, S. G., 43 (Dys.)
Granjux, 577 (Mal.)
Grant, G. B., & Wilson, E. R., 88 (Misc.)
Grant, M., with Wallace, 668 (Hel.)
Grantham-Hill, C., with Atkey, 872 (Mal.)
Grassi, B., 479, 481 (Z.), 857 (Mal.)
Graziadei, G., & Mario, S., 706 (Dys.)
Green, A. S., & Pacheco, L. R., 63 (Oph.)
Greenbaum, S. S., with Klauder, 174 (Der.)
——, & Schamberg, J. F., 593 (Lep.)
Greig, D. M., 838 (Z.)
Grifi, V., 655 (Hel.)
Gros, H., 582 (Mal.)
Guiart, J., with Gabrielides, 487, 840 (Z.)
Guillaumie, M., with Frouin, 514 (S.S.)
Guimarães, A., (707) (Dys.)
Guimãraes, U. P., with Colares, 431 (Misc.)
Guinon, L., & de Pfeffel, (376) (Pl.)
Gujo, K., & Chuma, M., 593 (Lep.)
Gulbransen, R., with Browning, 882 (S.S.)
Gunn, H., 819 (Z.)
Gupta, B. M. D., 548 (K.A.), 559 (R.F.)
Gupta, H. D., 58 (Oph.), 227 (Hel.)
Gupta, J. M. S., 169 (Der.)
v. Gutfeld, F., 785 (Lab.)
Guthrie, J. B., 581 (Mal.)

H

Hacker, H. P., 111 (Z.)
Hackett, 242 (Hel.)
Hage, 676 (Am.)
Hagiwara, H., with Hashimoto, 844 (Z.)
Håkansson, E. G., 238 (Hel.)
Halberkann & Giemsa, with Mayer & Zeiss, 879 (S.S.)
Halbreich, J., with Oettinger, 557 (R.F.)
Hall, J. S., with Dutcher & Harshaw, 420 (Sc.)
Hall, M. C., 200 (Hel.)
Haner, R. C., with Kendall, 339 (Dys.)
——, with ——, & Bly, 339 (Dys.)
Hannibal, E. A., & Boyd, M. F., 52 (Sp.)
Hansen, I., 678 (Am.)
Hanson, H., 286 (Mal.)
Hara, M., with Ohomori, Ohhashi, Nakanichi, & Ota, 759 (Bb.)
Harada, S., with Nomura & Sotoma, 377 (Chl.)
Harford, C. F., 60 (Oph.)
Harkness, A. H., 647 (Hel.)
Harman, N. B., (715) (Oph.)
Harold, C. H. H., 556 (R. F.)
Harper, P., 395 (Lep.)
Harrison, P. W., 647 (Hel.)
Harsant, A. G., 211 (Hel.), (349) (Bl.)
Harshaw, H. M., with Dutcher & Hall, 420 (Sc.)
Hartman, H., & Bowie, A., 375 (Pl.)
Hartwell, J. B., 819 (Z.)
Harvey, W. F., 83, 84, 86, 87 (Misc.), 771, 781 (Lab.)
——, & Iyengar, K. R. K., 80 (Misc.), 779 (Lab.)
——, ——, & Christophers, S. R., 81 (Misc.)
Hashimoto, T., & Hagiwara, H., 844 (Z.)

Hattori, T., with Kawamura & Yamaguchi, 71, 753 (Fev.)
Haughwout, F. G., 105, 106, 498 (Z.), 700 (Dys.)
Hauke, H., with Mathias, 694 (Dys.)
Hausherr, O., 46 (Dys.)
Hausmann, T., 704 (Dys.), 765 (Sc.)
Hawk, P. B., with Smith & Bergeim, 419 (Sc.)
Haworth, W. E., 829 (Z.)
Hayashi, N., 71 (Fev.)
Haydon, L. G., 366 (Pl.)
Hayne, T. B., with Barber, 482 (Z.)
Hazra, M. M., 496 (Z.)
Heck, M. E., 406 (Tb.)
Heckel, F., 614 (Misc.)
von Hecker, with Fischer, 788 (Sp.)
Hegh, E., with Austen, E. E., 898 (B.R.)
Hegner, R. W., 153 (S.S.), 462 (Z.)
Heinemann, H., 88 (Misc.), 299 (Mal.)
Hele, T. S., 585 (Mal.)
——, with Wenyon, Anderson, McLay & Waterston, 889 (B.R.)
Henric & Lamoureux, 568 (Y.F.)
Henry, 390 (Lep.), 799 (Misc.)
Hermel, 40 (Dys.)
Hermitte, L. C. D., (672) (Hel.)
Herms, W. B., 481 (Z.)
Hernault, J., 651 (Hel.)
Herringham, W. P., with Macpherson, Elliott & Balfour [Edited by], 800 (B.R.)
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Hesnard, A., 862 (Mal.)
Hess, A. F., & Unger, L. J., 421 (Sc.)
Hess, W. R., 414 (Bb.)
Hesser, S., with Kling, 375 (Pl.)
Hewlett, R. T., & Nankivell, A. T., 176 (B.R.)
Hildebrand, S. F., 112, 495 (Z.)
Hill, G. F., 827 (Z.)
Hingston, R. W. G., 528 (Misc.)
Hiraishi, S., with Taguchi & Kwa, 759 (Bb.)
Hirson, B., with Corfield, 659 (Hel.)
Hirst, S., 809 (B.R.)
Hirtzmann, L., 330 (Am.)
Hoare, C. A., 107 (Z.), 874 (S.S.)
Hodgson, E. C., 733 (Pl.)
Hodson, V. S., 196, 212, 670 (Hel.), 297 (Mal.), 330 (Am.)
Hoey, M. J., 435 (Misc.)
Hoffmann, W. H., 440 (Misc.), 495 (Z.), 564, 565, 569 (Y.F.)
Hofmeister, F., 412 (Bb.)
Hogue, M. J., 104 (Z.)
Holland, B. T., 55 (Oph.)
Holland, Malariacommissie, 282, 855 (Mal.)
Hollande, A. C., with Cade, 51 (Dys.)
Hollenbeck, H. S., 612 (Misc.)
Hollmann, H. T., 395 (Lep.)
Home, W. E., 294 (Mal.)
Honda, I., 228 (Hel.)
Hone, F. S., 754 (Fev.)
van Hoof, 605 (Misc.)
——, with van den Branden, 556 (R.F.), 870 (Mal.), 881 (S.S.)
Hooper, C. W., with Johnson, 74 (Bb.)
Höppli, 650 (Hel.)
Hornabrook, R. W., 734 (Pl.)
van Horne, E. G., with Givens & McClugage, 419 (Sc.)
Horne, J. R., 616 (Misc.)
Hornus, P., 867 (Mal.)
Horst, M. D., 73 (Bb.)
Horta P., 160 (Der.)
Houssay, B. A., & Negrete, J., (499) (Z.)
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Howard, R., 167 (Der.)
Howards & Sons, Ltd., 865 (Mal.)
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Hurst, A. F., 49 (Dys.)
Hutinel, J., with Widal & Abrami, 683 (Am.)
Hylkema, B., 373 (Pl.)
——, with Schüffner, 287, 572 (Mal.)

I

Iitayo, K., 381 (Chl.)
Iltis, H., 832 (Z.)
Inda, F. F., with Vaccarezza & Posse, 897 (B.R.)
Indian Science Congress Handbook, 359 (B.R.).
Ingram, A., (672) (Hel.), 839 (Z.)
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——, with Macfie, J. W. S., 434 (Misc.), (850) (Z.)
Ionesco, D., & Popper, M., 582 (Mal.)
Irisawa, 763 (Bb.)
Irvine, L. G., with Watkins-Pitchford & Smith, 401 (Tb.)
Irving, H., with Summons, 212 (Hel.)
Ishiwara, K., & Ogata, N., 754 (Fev.)
Ito, S., with Ando, 668 (Hel.)
Iturbe, J., 470 (Z.)
——, & González, E., 324 (R.F.), 602 (Der.)
Iyengar, K. R. K., 407 (Tb.)
——, with Harvey, 80 (Misc.), 779 (Lab.)
——, with ——, & Christophers, 81 (Misc.)
Iyengar, M. O. T., 483, 833 (Z.)
Izar, G., 685 (Am.)

J

Jackson, H. G., 215 (Hel.)
Jackson, L., 686 (Am.)
Jacoby, F., 43 (Dys.)
Jaffé, R. H., 748 (Und.)
Jagger, T. R., with McWhae, 203 (Hel.)
Jahier, with Benhamou & Berthelemy, 291 (Mal.)
James, S. P., 474 (Z.)
Jamot, 144 (S.S.)
Jancsó, N., 586 (Mal.)
Janowski, W., 39 (Dys.)
Jeanselme, E., Schulmann, E., & Pomaret, M., 225 (Hel.)
Jegat, Y., with Lenoble, 682 (Am.)
Jelks, J. L., 423 (Pel.)
Jemma, G., 314 (K.A.)
Jensen, E. T., (158) (S.S.)
Jepps, M. W., 30 (Am.), 459 (Z.)
de Jesús, V., 394 (Lep.)
Jezierski, W., & Wierzbicki, B., 337 (Dys.)
Jimenez, J., with Legroux, 314 (K.A.)
Jiménez, R. M., (589) (Mal.)
Job, E., 38 (Dys.)
Joff, I., with Kitaeff, 867 (Mal.)
John, J. C., 33 (Am.)
Johns Hopkins Univ., 498 (Z.)
Johnson, J. M., 766 (Sc.)
——, & Hooper, C. W., 74 (Bb.)
Johnson, R. E. I., 579 (Mal.)
Johnson, W. B., 527 (Misc.)
——, with Davies, 67 (Fev.)
Johnston, T. H., 486 (Z.)
Jojot, Ch., 501 (S.S.)
Joltrain, E., & de Gennes, L., 376 (Pl.)
Jona, G., 292 (Mal.)
Jones, D. E., with Lornie, 695 (Dys.)
Jones, D. W. C., 27 (Am.)
Jones, S. B., 649 (Hel.)
Jonesco-Mihaesti & Popesco, C., 700 (Dys.)
de Jong, D. A., 697 (Dys.)
Jorge, R., 425 (Pel.)
José Amaya, P., (756) (Fev.)
Joseph, F. H., 771 (Lab.)
Josephs, H. W., & Davison, W. C., 337 (Dys.)
Jouenne, 597 (Sk.), 796 (Misc.)
——, with Noc, 597 (Der.)
——, with Nogue, 878 (S.S.)
Joulia, P., with Dubreuilh, 596 (Der.)
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—— of Parasitology, 200 (Hel.)
—— of Tropical Medicine & Hyg., 529 (Misc.)
Jouveau-Dubreuil, 793 (Misc.), 410 (Bb.)
Julio Muniz, with Da Cunha, 820 (Z.)

K

Kabeshima, T., 738 (Chl.)
Kagoshima, S., 760 (Bb.)
Kamimura, Y., & Tsuda, K., 739 (Chl.)
Kanai, S., 341 (Dys.)
Kaneko, J., 760 (Bb.)
Kaneko, R., 324 (R.F.)
Karwacki, L., & Krakowska, Z., 558 (R.F.)
Kasai, K., 559 (R.F.), 562 (Jaun.)
Kato, G., Shizume, S., & Maki, R., 75, 413 (Bb.)
Katsura, H., with Kumagaya, Oyama & Saito, 762 (Bb.)
Kawai, J., with Watanabe, Y., & Watanabe, H., 384 (Chl.)
Kawakami, Z., 413 (Bb.)
——, & Kitagawa, M., 228 (Hel.)
Kawamura, R., Hattori, T., & Yamaguchi, M., 71, 753 (Fev.)
——, & Yamaguchi, M., 218 (Hel.), 753 (Fev.)
Kawatani, M., with Watanabe, Y., & Watanabe, H., 384 (Chl.)
Kazama, Y., 648 (Hel.)
Kazuo, H., 60 (Oph.)
Keates, H. C., 755 (Fev.)
Keilin, D., 113, 114 (Z.)
Kendall, A. I., & Haner, R. C., 339 (Dys.)
——, ——, & Bly, R. S., 339 (Dys.)
Kennedy, J. C., with Dive, 386 (Ent.)
Kenneth, J. H., 809 (B.R.)
Kenya Colony, 615 (Misc.), 842 (Z.)
Ketron, L. W., 172 (Der.)
Khaled, E., 351 (Und.)
Khalil, M., 120 (Z.), 213, 245, 646, 649 (Hel.)
Kiamil, M., 728 (Pl.)
Kieffer, J. J., 114, 495 (Z.)
Kilker, C. H., with McCord, & Minster, 167 (Der.)
Kilpatrick, G. C., 691 (Am.)
Kimura, O., 219 (Hel.)
Kirkpatrick, H., 60, 713 (Oph.), 91 (B.R.)
Kirschner, L., with Doerr, 298 (Mal.)
Kitaeff, F., & Joff, I., 867 (Mal.)
Kitagawa, M., with Kawakami, 228 (Hel.)
Klauder, J. V., & Greenbaum, S. S., 171 (Der.)
Kligler, I. J., & Robertson, O. H., 323 (R.F.)
Kling, C., & Hesser, S., 375 (Pl.)
Kling, D., 342, 693 (Dys.)
——, with Bernstein & Rosenblatt, 332 (Dys.)
Klippel & Monier-Vinard, 312 (K.A.)
Knight, H. H., 843 (Z.)
Knighton, J. E., 820 (Z.)

Knorr, M., 334 (Dys.)
Knuth, P., & du Toit, P. J., 263 (B.R.)
Kobayashi, C., 121 (Z.)
Kobayashi, H., 115, 834 (Z.), 650, 659 (Hel.)
Kobayashi, S., 217 (Hel.)
Koch, J., 378 (Chl.)
Kodama, H., (741) (Chl.)
Kodama, T., 381, 738 (Chl.)
——, & Takeda, E., 380 (Chl.)
Kofoid, C. A., & Swezy, O., 684 (Am.)
——, Boyers, L. M., & Swezy, O., 685 (Am.)
Kogerer, H., 580 (Mal.)
Kohgi, C., 657 (Hel.)
Koidzumi, M., 465 (Z.)
Kojima, S., & Do-Kin, C., 173 (Der.)
Kojima, T., & Gei, K., 195 (Hel.)
Kolisch, R., 707 (Dys.)
Kolmer, J. A., with Schamberg & Raiziss, 143 (S.S.)
Kolpakoff, F. A., with Yakimoff, 461 (Z.)
Kondô, K., 233, 238, 657 (Hel.)
Kondo, Y., 233 (Hel.)
Konsuloff, S., 112 (Z.)
Kop, W. A., 88 (Misc.), 290 (Mal.)
Kopke, A., 713 (Oph.)
Korniloff, M. T., with Yakimoff, Wassilewsky & Zwietkoff, 467 (Z.)
Korteweg, P. C., 282, 855, (Mal.)
Korthof, G., 697 (Dys.)
Koster, S., 90 (Misc.)
Kostrzewski, J., 37 (Dys.)
Kotlán, A., 820 (Z.)
Krákowska, Z., with Karwacki, 558 (R.F.)
Kramer, P. H., 865 (Mal.), (707) (Dys.)
Kraus, R., 382 (Chl.), 847 (Z.)
Krause, D. J., 762 (Bb.)
Krause, M., 514 (S.S.)
Krediet, G. J., 716 (B.R.)
Kremer, W. (707) (Dys.)
Krueger, M., with Rosenthal, 154 (S.S.)
Kubo, K., 761 (Bb.)
Kudo, R., 107, 108, 470 (Z.)
Kuenen, W. A., 73 (Bb.)
Kuhn, P., 834 (Z.)
Kulp, W. L., with Anderson, 761 (Bb.)
Kumagaya, M. M. K., Oyama, T., Katsura, H., & Saito, D., 762 (Bb.)
Kuntze, G., 37 (Dys.)
Kwa, F., with Taguchi & Hiraishi, 759 (Bb.)

L

Laake, E. W., with Bishopp, 485 (Z.)
——, with Wells & Bishopp, 471 (Z.)
Labbé, M., & Eith, H., 703 (Dys.)
Lacroix, A., with Montpellier, 164 (Der.), 229, 230 (Hel.)
Lacroix, A., with Montpellier & Boutin, 230 (Hel.)
——, with —— & Degouillon, 172 (Der.), 229 (Hel.)
Lade, O., 36 (Dys.)
La Frenais, H. M., with Cornwall, 304 (K.A.), 618 (Misc.)
——, with Patton & Sundara Rao, 304 (K.A.)
Laignel-Lavastine, with Colin & Mourgue, 504 (S.S.)
Laigret, with Ouzilleau & Lefrou, 231 (Hel.)
Laing, F., 899 (B.R.)
Lake, G. C., with Francis, 442 (Misc.)
Lambert, R. A., 609 (Misc.)
Lambert, S. M., 195 (Hel.)
Lamborn, W. A., 113, 475, 831 (Z.)
Lamoureux, with Henric, 568 (Y.F.)
Lane, C., 93 (Mal.)
Lane, C. G., 599 (Der.)
Lanfranchi, A., & Sani, L., 150 (S.S.)
de Langen, C. D., 796 (Misc.)
Langeron, M., 266 (B.R.), 472, 478 (Z.)
Langley, G. J., 329 (Am.)
Langworthy, H. V., with Wadsworth, Stewart, Moore & Coleman, 561 (Jaun.)
Lankester, A., 268 (B.R.)
Lantin, P. T., 696 (Dys.)
Laporte, 591 (Lep.)
Laporte, F., & Roques, E., 682 (Am.)
Larrousse, F., 487 (Z.)
——, with Brumpt, 845 (Z.)
Lasbrey, F. O., & Coleman, R. B., 210 (Hel.)
Laveran, A., 851 (Mal.)
de Lavergne, V., 705 (Dys.)
——, with Besson, 338 (Dys.)
Lavier, G., 467, 470 (Z.)
——, with Brumpt, 881 (S.S.)
Lawrence, H., 172 (Der.), 494, (499) (Z.)
League of Nations, 336 (Dys.)
Le Dantec, 792 (Misc.)
Lefebvre, C., & Baillat, (672) (Hel.)
Lefrou & Ouzilleau, 505 (S.S.)
——, with —— & Laigret, 231 (Hel.)
Legangneux, H., with Loir, 843 (Z.)
Legendre, J., 480 (Z.)
——, & Oliveau, A., 111 (Z.)
Leger, A., 851 (Mal.)
——, A. & M., 107 (Z.)
Leger, M., 196, 222, 247 (Hel.), 587 (Mal.)
——, & Baury, A., 367, 732, 733 (Pl.), 852 (Mal.), 887 (S.S.)
——, & Pringault, E., 201 (Hel.)
Legg, J., & Rheuben, J. A., 258 (Hel.)
Legroux, R., & Jimenez, J., 314 (K.A.)
Leiper, R. T., 361 (Hel.)
Leipoldt, C. L., Cleaver, A. F., & Elias, P., 284 (Mal.)

Leite, R., (673) (Hel.)
Leiva, L., (499) (Z.)
Lellis, A., 252, (673) (Hel.)
Lelong, M., with Courcoux & Cordey, 746 (Und.)
Lemaire, N., 569 (Y.F.)
Lemann, I. I., 430, 431 (Misc.)
Lemoine, G. H., (872) (Mal.)
Lenoble, E., & Jegat, Y., 682 (Am.)
Le Noir & de Fossey, M., 688 (Am.)
Lenz, W., 613 (Misc.)
Léo, G., 199 (Hel.)
Léon, N., 116 (Z.)
——, & Ciurea, I., 651 (Hel.)
Leone, R., 299 (Mal.), 690 (Am.)
Lepine, 145 (S.S.)
Le Roy des Barres, A., 704 (Dys.)
Lesage, A., 384 (Chl.)
Levaditi, C., with Sazerac, 143 (S.S.)
Le Vilain, with de Goyon, 168 (Der.)
Levy, M. D., 343 (Dys.)
Leynen, E., with Bessemans, 884 (S.S.)
Lhéritier, A., with Sergent, Edm. & Et., & Donatien, 148 (S.S.)
Lhuerre, 760 (Bb.)
Li, T. M., 56 (Oph.)
Lichtenstein, A., 41 (Dys.), 327, 679 (Am.)
Linden, W. Z., with Breene, 609 (Misc.)
Lindtrop, G., with Sdrodowski, 854 (Mal.)
Lisbonne, M., & Carrère, L., 699 (Dys.)
Lister, S., 438 (Misc.)
Llambias, J., & Lorenzo, D., 173 (Der.)
Lobel, A., with Staicovici, 61 (Oph.)
Lockhart-Mummery, J. P., 49 (Dys.)
Loewenthal, W., 47 (Dys.)
Loewy, J., 289 (Mal.)
Van Loghem, J. J., 727 (Pl.)
Loir, A., & Legangneux, H., 843 (Z.)
Lombard, P., & Béguet, M., 353 (Und.)
Lonjarret, 876 (S.S.)
van Loon, F. H., 356 (B.R.), 791 (Misc.)
Lorenz, F. H., 35 (Dys.)
Lorenzo, D., with Llambias, 173 (Der.)
Lornie, P., & Jones, D. E., 695 (Dys.)
Loubrieu, with Paisseau, 576 (Mal.)
Loughnan, W. F. M., 70 (Fev.), 840 (Z.)
Louis, D. J., 846 (Z.)
Louys, G., 795 (Misc.)
Low, G. C., & Newham, H. B. G., 503 (S.S.)
——, & O'Driscoll, E. J., 226 (Hel.)
Lucey, H. C., 290 (Mal.)
Lucie-Smith, J. D., 447 (B.R.)
Ludlow, C. S., 483 (Z.)
Luhn, O. G. F., 162 (Der.)
Luisi, 734 (Pl.), 875 (S.S.)
Lumbroso, U., 710 (Oph.)
Lynch, K. M., 171 (Der.), 819, 824, (849) (Z.)

M

MacArthur, W. P., 470 (Z.)
MacCallan, A. F., 243 (Hel.)
MacCallum, W. G., & Moody, L. M., 438 (Misc.)
McClugage, H. B., with Givens & van Horne, 419 (Sc.)
McCord, C. P., Kilker, C. H., & Minster, D. K., 167 (Der.)
McCornack, P. D., 119 (Z.)
McCready, J. W., 426 (Pel.)
MacDonald, A., 577 (Mal.)
McDonald, F. R., 330 (Am.)
MacDonald, N., with Chalmers, 175 (Der.)
McDonald, W. M., 70 (Fev.), 572 (Mal.)
McFarland, W. L., 654 (Hel.)
——, with Teague & Bates, 435 (Misc.)
Macfie, J. W. S., 433 (Misc.), 482 (Z.)
——, & Ingram, A., 434 (Misc.), 484, (850) (Z.)
——, with Carter & Ingram, 114 (Z.)
McGee, H. S., 598 (Der.)
McGill, C., 343 (Dys.)
MacGregor, M. E., 473, 476, 483 (Z.)
McKendrick, A. G., 79 (Misc.)
Mackey, G., 84 (Misc.)
Mackie, F. P., with Fox, 310 (K.A.)
——, with Trasler, 701 (Dys.), 736 (Chl.), 770 (Lab.)
McKinstry, W. H., 317 (K.A.)
McLay, K., 570 (Mal.)
——, with Wenyon, Anderson, Hele & Waterson, 889 (B.R.)
McMillan, T. M., with Weidman, 597 (Der.)
MacNaughton, J. G., 609 (Misc.)
Macpherson, W. G., Herringham, W. P., Elliott, T. R., & Balfour, A. [Edited by], 800 (B.R.)
Macrae, A., 63 (Oph.)
McVail, J. B., 249 (Hel.)
McWhae, D. M., & Jagger, T. R., 203 (Hel.)
de Magalhaes, A., 591 (Lep.)
de Magalhaes, P. S., 163 (Der.), 608 (Misc.)
Mahulete, J., (850) (Z.)
Maië, S., 594 (Lep.)
Maki, R., with Kato & Shizume, 75, 413 (Bb.)
Malaria-Commissie voor Noordholland, 282, 855 (Mal.)
Mallardi, M., 313 (K.A.)
Malone, R. H., 86, 605 (Misc.), 769 (Lab.)
——, & Goré, S. N., 81 (Misc.)
Manini, L., 31 (Am.)
Mansoor, R., 732 (Pl.)
Maplestone, P. A., 258 (Hel.)

Marais, D. P., 746 (Und.)
Marantonio, R., 572 (Mal.)
Marchand, H., 594 (Lep.)
Marchoux, E., 280, 291, 575 (Mal.), 396 (Lep.)
——, & others, 570 (Mal.)
Marcou, H., 871 (Mal.)
Marinesco, M. G., (300) (Mal.)
Mario, S., with Graziadei, 706 (Dys.)
Marshall, C. H., 141 (S.S.)
——, with Eyre, 141 (S.S.)
——, & Vassallo, S. M., 141 (S.S.)
Marshall, J. F., 829 (Z.)
Martini, E., 110, 114, 474, 483, (499) (Z.), 358 (B.R.)
Marzin, G., & Gambier, A., 168 (Der.)
Marzinowsky, E. J., 824, 836 (Z.)
Masaki, S., 382, 383, 737 (Chl.)
Massia, G., with Nicolas & Dupasquier, 423 (Pel.)
Mas Soeradji, with Schuurmans Stekhoven, Jr., & Schuurmans Stekhoven, A. W., 665 (Hel.)
Matheu, C. P., 416 (Bb.)
Mathias, F., & Hauke, H., 694 (Dys.)
Mathieu, 584 (Mal.)
Mathur, S. N., 601 (Der.)
da Matta, A., 161, 166 (Der.), 196 (Hel.), 590 (Lep.), 841 (Z.)
Mattos, B., 393 (Lep.)
Mauriac, P., & Boyer, R., 214 (Hel.)
Maxcy, K. F., 50 (Dys.), 583 (Mal.)
Maxwell, J. P., 109 (Z.)
Mayer, A., 557 (R.F.)
Mayer, M., 158, 509, 879 (S.S.), 584 (Mal.)
——, & Menk, W., 508, 879 (S.S.)
——, & Zeiss, H., 133, 508 (S.S.)
——, & ——, with Giemsa & Halberkann, 879 (S.S.)
Maynard, F. P., 64 (Oph.)
Mayne, B., 868 (Mal.)
——, with Francis, 442 (Misc.)
Mazzocco, P., with Houssay, Otero, & Negrete, 497 (Z.)
Mebius, J., 220 (Hel.)
Meded. v. d. Burgerlijk. Geneesk. Dienst in Nederl.-Indië, 604 (Misc.)
de Medeiros, A., 405 (Tb.)
Megaw, J. W. D., 40 (Dys.), 67 (Fev.), 243 (Hel.), 551 (K.A.)
Mehrdorf, R., 318 (K.A.)
Mei, A., (672) (Hel.)
de Mello, F., 159, 161 (Der.), 437 (Misc.)
——, & Correa Afonso, P., 846 (Z.)
——, Nunes, J. P., & Ribeirom, J. L., (850) (Z.)
Mendelson, R. W., 432 (Misc.), 562 (Jaun.), 582 (Mal.), 599 (Der.), 755 (Fev.)
Menk, W., with Mayer, 508, 879 (S.S.)
——, with Mühlens, 31 (Am.), 134 (S.S.)
Méo, J., 601 (Der.), 614 (Misc.)
Mesnil, F., 825 (Z.)
Meyer, K. F., with Fleischner, Vecki & Shaw, 350 (Und.)
——, Shaw, E. B., & Fleischner, E. C., 749 (Und.)
Mhaskar, K. S., 242, 257, 662 (Hel.)
——, with Caius, 250, 662 (Hel.)
Michael, D. F., 496 (Z.)
Michail, D., 60 (Oph.)
Michel, P., with Mouriquand, 421, 422, 766 (Sc.)
——, with ——, & Barre, 766 (Sc.)
——, with ——, & Nicodièvitch, 762 (Bb.)
Michon, L., with Bonnet, 50 (Dys.)
Miginiac, 680 (Am.)
Milio, G., 309 (K.A.)
de Milita, V., 758 (Bb.)
Miller, D., 830 (Z.)
Miller, D. W., with Voegtlin, 883 (S.S.)
Miller, G. A., with Yakimoff, 461 (Z.)
Mills, P. S., 546 (K.A.)
Milton, F., (672) (Hel.)
Minoda, M., 335 (Dys.)
Minster, D. K., with McCord, C. P., & Kilker, 167 (Der.)
Minvielle, with Rémond, 352 (Und.)
Mironesco, T., 715 (Oph.)
Mita, K., 335, 693 (Dys.)
Mitamura, T., with Nagayo, Miyagawa, Tamiya & Tenjin, 494 (Z.)
Miyagawa, Y., 244 (Hel.)
——, with Nagayo, Mitamura, Tamiya & Tenjin, 494 (Z.)
——, & Takemoto, S., 202 (Hel.)
Miyake, M., (741) (Chl.)
Moinson, L., with Sartory, 432 (Misc.)
Monier-Vinard, with Klippel, 312 (K.A.)
Montana, 118 (Z.)
Monteiro, J. N. de S., (560) (R.F.)
Montel, L. R., 165 (Der.)
Montes, J. E., 762 (Bb.)
Montoya, T. W., 240 (Hel.)
Montpellier, J., 599 (Der.)
——, Degouillon & Lacroix, A., 172 (Der.), 229 (Hel.)
——, & Gouillon, P., 164 (Der.)
——, & Lacroix, A., 164 (Der.), 229, 230 (Hel.)
——, & ——, & Boutin, P., 230 (Hel.)
——, ——, & Barre, L., 766 (Sc.)
Moodie, W., with Dawson, 39 (Dys.)
Moody, L. M., 438 (Misc.)
——, with MacCallum, 438 (Misc.)
Moore, A. C., with Wadsworth, Langworthy, Stewart & Coleman, 561 (Jaun.)

Moore, A. H., 656 (Hel.)
Mora, A D., 368 (Pl.)
Moreau,R., with Diacono, 204 (Hel.)
Morin, G. H., 201, 207 (Hel.), 347 (Bl.)
Motais, F., 194 (Hel.)
Mouchet, R., 868 (Mal.)
——, with van Nitsen, 601, 603 (Der.)
——, ——, & Walravens, P., 87 (Misc.)
Mourgue, R., with Colin & Laignel-Lavastine, 504 (S.S.)
Mouriquand, G., & Michel, P., 421, 422, 766 (Sc.)
——, ——, & Nicodiévitch, 762 (Bb.)
Msciwoj, L., 692 (Dys.)
Mühlens, P., 227 (Hel.)
——, & Menk, W., 31 (Am.), 134 (S.S.)
Muir, E., 267 (B.R.), 389 (Lep.)
Mujica, J. C. A., (300) (Mal.)
Mukarji, R. M., 864 (Mal.)
Mulherin, F. X., with Mulherin, W. A., 860 (Mal.)
Mulherin, W. A., & Mulherin, F. X., 860 (Mal.)
Müller, L. R., 610 (Misc.)
Muñoz Ochoa, M., 566 (Y.F.)
Murata, M., 75 (Bb.)
Muraz, G., 500 (S.S.)
Murray, W. A., 129 (S.S.), 488 (Z.)
Müssig, R., 237 (Hel.)
Mutermilch, S., 618 (Misc.), 739 (Chl.)
Muto, M., 220, 221 (Hel.)

N

Nagayo, M., Miyagawa, Y., Mitamura, T., Tamiya, T., & Tenjin, S., 494 (Z.)
Nagger, S. B., 585 (Mal.)
Nakagawa, K., 215 (Hel.)
Nakanichi, H., with Ohomori, Ohhashi, Hara & Ota, 759 (Bb.)
Nand Lal, 80, 83 (Misc.)
Nankivell, A. T., with Hewlett, 176 (B.R.)
Napier, L. E., 311 (K.A.), 546, 550 (K.A.)
Nattan-Larrier, L., 130, 132, 133, 151, 515 (S.S.)
Navarro, A., 512 (S.S.)
Navarro-Martin, A., 512 (S.S.)
——, & Stefanopoulo, G. J., 513 (S.S.)
Neame, H., 393 (Lep.)
Nedergaard, N., 285 (Mal.), 458 (Z.)
Negrete, J., with Houssay, Otero, & Mazzocco, 497 (Z.)
Negroni, P., 733 (Pl.), (741, Chl.)
Neudörfer, A., (672, Hel.)
Neukirch, P., 292 (Mal.)
Neves, J. da S., 614 (Misc.)
Neveu-Lemaire, 92 (B.R.), 222 (Hel.), 734 (Pl.), (741) (Chl.), 855 (Mal.), 888 (S.S.)
Neveux, (300) (Mal.)
Neville, W. S. T., 55 (Oph.)
Newcomb, C., 359 (B.R.)
Newham, H. B., & Duncan, J. T., 797 (Misc.)
——, with Low, 503 (S.S.)
Newman, R. E. U., 554 (K.A.)
Newstead, R., 484 (Z.)
——, with Davey, 475 (Z.)
——, & Evans, A. M., 117, 490 (Z.)
Ni, T. G., 414 (Bb.)
Nicodiévitch, with Mouriquand Michel, 762 (Bb.)
Nicolas, J., & Favre, M., 799 (Misc.)
——, Massia, G., & Dupasquier, D., 423 (Pel.)
Nicolle, C., 310 (K.A.), 614 (Misc.), 708 (Oph.)
——, & Conseil, E., 742 (Und.)
——, & Cuénod, A., 59 (Oph.)
——, & Gobert, E., 204 (Hel.)
Nieschulz, O., 887 (S.S.)
Nieuwenhuijse, A., (589), 866 (Mal.)
Nishida, T., 237 (Hel.)
van Nitsen, R., 600 (Der.)
——, & Bequaert, M., 706 (Dys.)
——, & Mouchet, R., 601 (Der.)
——, with ——, 603 (Der.)
——, with ——, & Walravens, 87 (Misc.)
Niwa, T., with Yokoyama, 646 (Hel.)
Noc, F., 51 (Dys.), 367, 733 (Pl.), 834 (Z.)
——, & Jouenne, 597 (Der.)
——, & Nogue, 320 (R.F.)
——, & Baury, 878 (S.S.)
Noël, P., 392 (Lep.)
Noguchi, H., 563, (569) (Y.F.)
Nogue, 686 (Am.), 789 (S.S.)
——, with Noc, 320 (R.F.)
——, & Jouenne, 879 (S.S.)
Nomura, T., Sotoma, G., & Harada, S., 377 (Chl.)
de Nooy, J. A., 163 (Der.)
Normet, 168 (Sk.), 296 (Mal.)
Norris, D., 80, 81 (Misc.)
Nossen, H., with Rosenthal, 520 (S.S.)
Nowlin, N., 827 (Z.)
Nusshag, W., 883 (S.S.)

O

O'Driscoll, E. J., with Low, 226 (Hel.)
Obrenovitch, E., with Dupérié, 586 (Mal.)
Ochsenius, K., 667 (Hel.)
Oda, S., 739 (Chl.)
Oehler, R., 103 (Z.), 777 (Lab.)
d'Œlsnitz, Balestre, P. L., & Daumas, A., 550 (K.A.)
Oesterlin, E., 158 (S.S.)

Oettinger, J., & Halbreich, J., 557 (R.F.)
Ogata, N., with Ishiwara, 754 (Fev.)
Ogata, T., 75 (Bb.)
Ogawa, T., with Shimura, 223 (Hel.)
Ohara, M., 592 (Lep.)
Ohhashi, Y., with Ohomori, Nakanichi, Hara & Ota, 759 (Bb.)
Ohkura, T., 740 (Chl.)
Ohomori, K., Ohhashi, Y., Nakanichi, H., Hara, M., & Ota, T., 759 (Bb.)
Ohyama, H., 384 (Chl.)
Olinescu, R., 860 (Mal.)
Oliveau, A., with Legendre, 111 (Z.)
de Oliveira, G., 131 (S.S.)
Olpp, 569 (Y.F.)
O'Malley, J. J., 444 (Misc.)
Onji, Y., 219 (Hel.)
Onorato, R., (560) (R.F.), 650, (673) (Hel.)
Orlebar, A., 293 (Mal.)
Ormond, A. W., 711 (Oph.)
Ornstein, M., 333 (Dys.)
Ornstein, O., 740 (Chl.)
Ortega, D. B., (300) (Mal.)
Ota, M., 596 (Der.)
Ota, T., with Ohomori, Ohhashi, Nakanichi, & Hara, 759 (Bb.)
Otero, M. J., with Houssay, Negrete & Mazzocco, 497 (Z.)
Otsubo, I., 380 (Chl.)
Ouzilleau, Laigret & Lefrou, 231 (Hel.)
——, with Lefrou, 505 (S.S.)
Oyama, T., with Kumagaya, Katsura, & Saito, 762 (Bb.)
Oyarzábal, J., with Dios, 157 (S.S.)

P

Pacheco, L. R., with Green, 63 (Oph.)
Paez, F. R., 104 (Z.), (416) (Bb.)
Pagenstecher, G. A., 598 (Sk.)
Paisseau, G., & Loubrieu, 576 (Mal.)
——, Schaeffer, H., & Alcheck, E., 294 (Mal.)
Palermo, P., 236 (Hel.)
Palestine, 853 (Mal.)
Palfrey, F. W., with Wolbach & Todd, 448 (B.R.)
Pansini, G., (872) (Mal.)
Pantaleoni, D., 599 (Der.)
Papastratigakis, C., 859 (Mal.)
Paranhos, U., & Reis, P., 27 (707), (Am.)
Parcellier, A., with Sabrazès & Bonnin, 238 (Hel.)
Parisot, J., & Simonin, P., 819 (Z.)
Parker, R. R., 119 (Z.)
Parmanand, M. J., 561 (Jaun.)
Parounagian, M. B., & Goodman, H., 602 (Der.)
Parrot, L., 173 (Der.), 316 (K.A.), 347 (Bl.), 484 (Z.)
——, & Donatien, with Sergent, Edm. & Et., 280, 870 (Mal.)
——, with Donatien, 886 (S.S.)
——, with Foley, 166 (Der.)
——, with França, 484 (Z.)
——, with Sergent, Edm. & Et., 823 (Z.)
——, with ——. Donatien & Béguet, 315 (K.A.)
——, with ——, & Foley, 478 (Z).
——, with Vialatte, 484 (Z.)
de Partearroyo, F. R., 741 (Chl.)
Patel, P. G., with Cross, 873 (S.S.)
Patterson, H. A., (672) (Hel.)
Patterson, S. W., & Williams, F. E., 48, 697 (Dys.)
Patton, W. S., 115, 117, 465, 485, 486, 487, 837, 838, 839, 840, 841, 846, (850), (Z), 302 (K.A.)
——, La Frenais, H. M., & Sundara Rao, 304 (K.A.)
Pavy, H. K., 213 (Hel.)
Pawan, J. L., 483 (Z.)
Payne, F. K., with Ackert, 664 (Hel.)
Payne, G. C., with Cort & Augustine, 664 (Hel.)
Pearce, L., 136 (S.S.)
Pease, R. A., with Eddy & Shelow, 420 (Sc.)
Pedley, F. G., 343 (Dys.)
Pedrosa, A., 314 (K.A.)
Pelletier, J., & Quemener, 348 (Bl.)
Peltier & Cavazza, 436 (Misc.)
Pennato, P., 579 (Mal.)
Pennington, J. R., 607 (Misc.)
Pentagna, O., 656 (Hel.)
Pentland, C., 236 (Hel.)
Pequeno (Junior), P. A., (673) (Hel.)
Perkins, G. A., 592 (Lep.)
Pessôa, S. B., 656 (Hel.)
Peutz, J. L. A., (589) (Mal.)
de Pfeffel, with Guinon, (376) (Pl.)
Pfeiler, W., 511 (S.S.)
Philippine Health Service, 394 (Lep.)
Phisalix, M., 622 (B.R.)
——, & Tejera, E., 107 (Z.)
Piccininni, F., 729, 730 (Pl.)
Pijper, A., 429 (Misc.)
Pillay, T. M., 238 (Hel.)
Piltz, G., 703 (Dys.)
Pino-Pou, R., 557 (R.F.)
Pinoy, E., 174 (Der.)
Pinto, C., 155 (S.S.)
——, with Godoy, 856 (Mal.)
Pirie, J. H. H., with Welchman, 164 (Der.)
Platz, C., 737 (Chl.)
Pol., O. J. H., (707, Dys.)

Polidori, V., 165 (Sk.), 775 (Lab.)
Pomaret & Andréani-Constantini, 208 (Hel.)
——, with Jeanselme & Schulmann, 225 (Hel.)
Pons, 345 (Bl.)
Popesco, C., with Jonesco, Mihaesti- 700 (Dys.)
Popowski, N., 240 (Hel.)
Popper, M., with Ionesco, 582 (Mal.)
Porter, A., 206 (Hel.)
Posse, R., with Vaccarezza & Inda, 897 (B.R.)
Pottevin, (384) (Chl.)
Poupelain, 165 (Der.)
Pratsicas, A., 863 (Mal.)
Prentiss, E. C., 33 (Am.), 51 (Dys.)
Pringault, E., with Leger, 201 (Hel.)
Priston, J. L., with Sanders, 202, 211 (Hel.)
von Prowazek, S., 176 (B.R.)
Public Health Reports, 425 (Pel.)
Puente, J. J., 776 (Lab.)
Pulgher, F., (735, Pl.)
Pupo, A., 170 (Der.)
Pusa, 4th Entomological Meeting, 845 (Z.)

Q

Quemener, with Pelletier, 348 (Bl.)
de Quervain, F., 603 (Der.)
Quiros, M., 568 (Y.F.)

R

Raabe, H., with Anigstein, 827 (Z.)
de Raadt, O. L. E., 90, 524 (Misc.)
Raiziss, G. W., with Schamberg & Kolmer, 143 (S.S.)
Raja, R. N., 864 (Mal.)
Ransom, B. H., & Cram, E. B., 234 (Hel.)
Rathery, F., & Cambessédès, 57 (Oph.)
Ravaut, P., 627 (B.R.)
——, & Charpin, 24 (Am.)
Rayson, H. K., 865 (Mal.)
Reed, A. C., with Ely & Wyckoff, 684 (Am.)
Reed, W. A., & Wolf, M., 171 (Der.)
Regnault, F., 856 (Mal.)
Reh, M., 585 (Mal.)
Reich, W. W., with Beckwith, 156 (S.S.)
Reichenow, E., 127, 128 (S.S.), 495, 849 (Z.)
Reis, A. P., 798 (Misc.)
Reis, P., with Paranhos, 27, (707) (Am.)
Remlinger, P., 319 (K.A.), 408 (Tb.), 522 (Misc.)
Rémond, A., & Minvielle, 352 (Und.)
Renč, V., 776 (Lab.)
Rénon, L., & Blamoutier, P., 31 (Am.)
Reverdin, H., & Chomé, E., 463 (Z.)
Reynolds, F. H. K., & Schoening, H. W., 884 (S.S.)
Rheuben, J. A., with Legg, 258 (Hel.)
Rice, L., 752 (Fev.)
Richet, C., fils, with Sainton & Schulmann, 578 (Mal.)
Rieux, G., & Delater, G., 859 (Mal.)
Rieux, J., 577 (Mal.)
Riganti, H., 691 (Dys.)
Righi, I., 554 (K.A.)
Rigollet, 297 (Mal.), 368, 728 (Pl.)
Riley, W. A., 471, 842 (Z.)
Rincones, P. G., (560) (R.F.)
Risquez, J. R., 201, 202, 213 (Hel.)
Roaf, H. E., 322 (R.F.)
Robertson, A., with Thomson, 23 (Am.)
Robertson, O. H., with Kligler, 323 (R.F.)
Robertson, R. C., with Coppinger, 698 (Dys.)
Rockefeller Foundation, 529 (Misc.), 900 (B.R.)
Röckemann, W., with Rodenwaldt, 665 (Hel.)
Rodenhuis, Y , 331 (Am.), 625 (B.R.)
Rodenwaldt, E., & Röckemann, W., 665 (Hel.)
Rodhain, J., 228 (Hel.), 517 (S.S.), 844 (Z.)
——, with Broden, 506 (S.S.)
Rodino, N., 326 (R.F.)
Roger, G. H., Widal, F., & Teissier, P. J., 804 (B.R.)
Rogers, L., 328 (Am.), 527 (Misc.)
Rohr, C., 160 (Der.)
Rokkaku, T., with Ujihara, 412 (Bb.)
Romero, N., 386 (Ent.)
Romero Sierra, J. M., 107 (Z.)
de Rook, H., with Brug, 830 (849) (Z.)
Root, F. M., 828 (Z.)
Roques, E., with Laporte, 682 (Am.)
Rose, F. G., 224 (Hel.)
Rose, W., 900 (B.R.)
Rosenblatt, S., with Kling & Bernstein, 332 (Dys.)
Rosenthal, F., & Freund, R., 888 (S.S.)
——, & Krueger, M., 154 (S.S.)
——, & Nossen, H., 520 (S.S.)
Ross, R., 574 (Mal.)
Roth, G. B., 80 (Misc.)
Roubaud, E., 113, 476, 478, 485 (Z.), 280 (Mal.)
——, & Franchini, G., 821 (Z.)
Rouillard, J., 200 (Hel.)
Rousseau, L., 223, 247 (Hel.)
Roy, J. N., 58 (Oph.), 131 (S.S.)
Roziès, H., 743 (Und.)
Ruiz Arnau, R., (672, Hel.)

Ruppe, with Gougerot, 394 (Lep.)
Rush, C. C., 61 (Oph.)
Russ, V., with others, 283 (Mal.)
Ryuji, S., 651 (Hel.)

S

Sabrazès, J., Parcelier, A., & Bonnin, H., 238 (Hel.)
van Saceghem, R., 173 (Sk.), 515, 518, 519, 886 (S.S.)
Sainton, P., Richet, C., fils, & Schulmann, E., 578 (Mal.)
Saito, D., with Kumagaya, Oyama & Katsura, 762 (Bb.)
Saito, T., (499) (Z.)
Salle with Decrop, 174 (Der.)
Salm, A. J., 73 (Bb.), 114 (Z.)
Salvat, P., with Fontoynont, 597 (Der.)
Salvat-Navarro, A., (751) (Und.)
Samut, R., 551 (K.A.)
Sanarelli, G., 379, 736 (Chl.)
Sanders, A. A., & Priston, J. L., 202, 211 (Hel.)
Sanders, J., 591 (Lep.)
Sanfilippo, E., 685 (Am.)
Sangiorgi, G., 464 (Z.), 558 (R.F.)
Sanguinetti A., 300 (Mal.)
Sani, L., 156 (S.S.)
——, with Lanfranchi, 150 (S.S.)
van Sant, H. M., with Young, 548 (K.A.)
Santarelli, P., 852 (Mal.)
Santos, F. O., 416 (Bb.)
Sántos Fernández J., 715 (Oph.)
Sari, E., 861 (Mal.)
Sarrailhé, A., 386 (Ent.)
Sartory, A., & Moinson, L., 432 (Misc.)
Sawyer, W. A., 244, 661 (Hel.)
Sazerac, R., & Levaditi, C., 143 (S.S.)
Schaeffer, H., with Paisseau & Alcheck, 294 (Mal.)
Schamberg, J. F., with Greenbaum, 593 (Lep.)
——, Kolmer, J. A., & Raiziss, G. W., 143 (S.S.)
Schiassi, F., 292 (Mal.)
Schickhardt, E., 666 (Hel.)
Schilling, C., with Caspari, 446 (B.R.)
Schilling, V., 611 (Misc.), 894 (B.R.)
Schmitt, H., 44 (Dys.)
Schmitter, F., 598 (Der.)
Schmitz, K. E. F., 334 (Dys.)
Schneemann, E., 325 (R.F.)
Schoening, H. W., with Reynolds, 884 (S.S.)
von Schuckmann, W., 135 (S.S.)
Schüffner, W., 73 (Bb.)
——, & Hylkema, B., 287, 572 (Mal.)
Schüle, 667 (Hel.)
Schulmann, E., with Jeanselme, & Pomaret, 225 (Hel.)
——, with Sainton & Richet, C., fils, 578 (Mal.)
Schultz-Bascho, P., 341 (Dys.)
Schuurmans Stekhoven-Meyer, A. W., with Schuurmans Stekhoven, Jr., J. H., & Mas Soeradji, 665 (Hel.)
Schwartz, B., 222, 660 (Hel.)
Schwetz, J., 489 (Z.), 502 (S.S.)
Scott, H. H., 24, 25 (Am.), 405 (Tb.)
Scott, Z. T., 407 (Tb.)
Sdrodowski, P., & Lindtrop, G., 854 (Mal.)
de Seabra, A., with Bettencourt & Borges, 206 (Hel.)
Sealy, G. O. F., 740 (Chl.)
Seguin, 584 (Mal.)
Séguy, E., 482 (Z.)
Seidelin, H., 569 (Y.F.)
Seidelin, H., 293 (Mal.)
Sella, M., 480 (Z.)
Selter, 667 (Hel.)
Selwyn-Clarke, P. S., 355 (B.R.)
Semon, H. C., 659 (Hel.)
Sen, D. N., 7979 (Misc.)
Sen, S. K., 829 (Z.)
——, with Senior-White, 841 (Z.)
Senevet, G., 786 (Lab.)
Senior-White, R. A., 110 (Z.)
——, with Fletcher, 888 (S.S.)
——, & Sen, S. K., 841 (Z.)
Sergent, Edm., 108 (Z.), 858 (Mal.)
Sergent, Edm., & Donatien, A., 148, 518 (S.S.)
——, & Foley, H., 321 (R. F.)
Sergent, Edm. & Et., 279, 280 (Mal.), 715 (Oph.)
——, Donatien, A., & Lhéritier, A., 148 (S.S.)
——, & Foley, H., 148 (S.S.)
——, & Parrot, L., 823 (Z.)
——, with ——, & Donatien, A., 280, 870 (Mal.)
——, ——, ——, & Béguet, M., 315 (K.A.)
——, ——, & Foley, H., 478 (Z.)
Sergent, Et., 106, 107 (Z.), 152 (S.S.)
——, & Gouillon, P., 227 (Hel.)
Sergent, Et. & Edm., 105, 469 (Z.)
Serra, A., 391 (Lep.)
Servantie, L., 215 (Hel.)
Shaw, C. G., 207 (Hel.)
Shaw, E. B., with Fleischner, Vecki & Meyer, 350 (Und.)
——, with Meyer, & Fleischner, 749 (Und.)
'S Heeren, 876 (S.S.)
Shelow, E., with Eddy & Pease, 420 (Sc.)
Shimura, S., & Ogawa, T., 223 (Hel.)
Shinkai, K., 411 (Bb.)

Shircore, J. O., 142 (S.S.)
Shizume, S., with Kato & Maki, 75, 413 (Bb.)
Shortt, H. E., 823, 824 (Z.)
——, with Connor, 552 (K.A.)
Sia, R. H. P., 310 (K.A.)
——, & Hsien Wu, 310 (K.A.)
Sichel, A. W. S., 708 (Oph.)
Sikl, H., 42 (Dys.)
Sikora, H., 499 (Z.)
da Silva, E. P., 562 (Jaun.)
Silva, F., 166 (Der.)
Silva, L., 162 (Der.)
da Silva, P., 163 (Der.)
da Silva, P. D., 198 (Hel.)
Silvestri, S., 865 (Mal.)
Simmonnet, H., 415 (Bb.)
Simon, C. E., 467 (Z.)
Simon, K. M. B., 173 (Der.)
Simon, S. K., 820 (Z.)
Simonin, P., with Parisot, 819 (Z.)
Simpson, W. J., 732 (Pl.)
Sinisi, G., 734 (Pl.)
Sinton, J. A., 106, 116, 472 (Z.), 862, 868 (Mal.)
Sistrunk, W. E., 608 (Misc.)
Skarič, J., 751 (Und.)
Sklarz, E., 861 (Mal.)
Smillie, W. G., 662 (Hel.), 734 (Pl.)
——, with Darling, 247, 249 (Hel.)
Smith, C. A., Bergeim, O., & Hawk, P. B., 419 (Sc.)
Smith, D. K., 319 (K.A.)
Smith, J. F., 679 (Am.)
Smith, J. M., with Watkins-Pitchford & Irvine, 401 (Tb.)
Smith, H., 714 (Oph.)
Smith, S., 646 (Hel.)
Smyrniotis, 32 (Am.)
Sodré, A., 529 (Misc.)
Sollier, N., with Carrieu, 562 (Jaun.)
Solovief, P., 710 (Oph.)
Solowzoff, A. S., with Yakimoff, 326 (R.F.), 343 (Dys.), 467 (Z.)
——, with ——, & Wassilewsky, 464 (Z.)
van Someren, W. H., 496, 842 (Z.)
Sotoma, G., with Nomura & Harada, 377 (Chl.)
South Africa, 615 (Misc.)
South African Medical Record, 299 (Mal.)
Spaar, E. C., 160 (Der.)
Spagnolio, G., 866 (Mal.)
Spence, R. C., 692 (Dys.)
Spencer, R. R., (376) (Pl.)
Spire, 568 (Y.F.)
Spolverini, L., 678 (Am.)
Sprawson, C. A., 410 (Bb.), 741 (Chl.)
Spruit, C. B., 658 (Hel.)
Squair, J., 417 (Sc.)
Squarti, G., 581 (Mal.)
Srivastava, A. N., 162 (Der.)
Staicovici, N., & Lobel, A., 61 (Oph.)
Stammers, A. D., (416) (Bb.)
Stammers, G. E. F., 107 (Z.)
Stanton, A. T., & Fletcher, W., 617 (Misc.)
Stawell, R. R., 47 (Dys.)
Stéfaloyannis, 588 (Mal.)
Stefanopoulo, G. J., with Navarro-Martin, 513 (S.S.)
Steffan, P., 152 (S.S.)
Steinegger, A., 239 (Hel.)
Stephens, J. W. W., 285 (Mal.), 744 (Und.)
Stévenel, L., 88 (Misc.)
Stevenson, A. C., 323 (R.F.), 878 (S.S.)
Stewart, F. C., with Wadsworth, Langworthy, Moore & Coleman, 561 (Jaun.)
Stewart, F. H., 233 (Hel.)
Stewart, R. M., 39 (Dys.)
Stiles, C. W., 232, 239 (Hel.), 674 (Am.)
Stitt, E. R., 896 (B.R.)
St. John, J. H., with Bates & Dunn, 320 (R.F.)
Strandberg, J., 173 (Der.)
Strater, P., (672, Hel.)
Strong, W. M., 114 (Z.), 754 (Fev.)
Sudan, Annual Report on Sleeping Sickness, 499 (Z.)
Suganuma, S., 653, 654 (Hel.)
Suldey, E. W., 758 (Bb.), 849 (Z.)
Sullivan, M. X., 426 (Pel.)
——, & Dawson, P. R., 426 (Pel.)
Summons, W. H., & Irving, H., 212 (Hel.)
Sundara Rao, with Patton & La Frenias, 304 (K.A.)
Sundt, O. F., with Thjötta, 699 (Dys.)
Sur, T., 431 (Misc.)
Sutherland, H., 293 (Mal.)
Sutherland, J. W., 497 (Z.)
Suzuki, 585 (Mal.)
Suzuki, T., 122 (Z.)
Swan, J. M., 868 (Mal.)
Sweet, W. C., 217 (Hel.)
Swellengrebel, N. H., 110, 114, (499), 832, (850) (Z.), 573 (Mal.)
Swezy, O., with Kofoid, 684 (Am.)
——, with ——, & Boyers, 685 (Am.)
Szyfman, L., 378 (Chl.)

T

Taboada, T. M., (672) (Hel.)
Taguchi, K., Hiraishi, S., & Kwa, F., 759 (Bb.)
Tait, J., 579 (Mal.)
Takahira, H., 414 (Bb.)
Takeda, E., with Kodama, 380 (Chl.)
Takemoto, S., with Miyagawa, 202 (Hel.)

Taliaferro, W. H., 516 (S.S.)
——, & Taliaferro, L. G., 877 (S.S.)
Tamiya, T., with Nagayo, Miyagawa, Mitamura & Tenjin, 494 (Z.)
Tamura, H., 171 (Der.)
Tanner, W. F., with Goldberger, 423 (Pl.)
Tawara, S., 335 (Dys.)
Teague, O., Bates, L. B., & McFarland, W. L., 435 (Misc.)
Teissier, P. J., with Roger & Widal, 804 (B.R.)
Tejera, E., with Phisalix, 107 (Z.)
Tembe, R. S., 120 (Z.)
Tenjin, S., with Nagayo, Miyagawa, Mitamura & Tamiya, 494 (Z.)
Teppaz, L., 367 (Pl.)
Thacker-Neville, W. S., 709 (Oph.)
van Thiel, P. H., 806 (B.R.)
Thjötta, T., & Sundt, O. F., 699 (Dys.)
Thompson, T. O., 385 (Ent.)
Thomson, J. G., with Broughton-Alcock, 464, 468 (Z.)
——, & Robertson, A., 23 (Am.)
Thomson, J. O., 799 (Misc.)
Thornhill, F. M., 349 (Bl.)
Thoulon & Forgues, 734 (Pl.)
Thursfield, J. H., 765 (Sc.)
Todd, J. L., with Wolbach & Palfrey, 448 (B.R.)
Tokyo Igakkwai Zasshi, 763 (Bb.)
Toomey, N., 858 (Z.)
Torres, C. M., 885 (S.S.)
Tournier, E., 600 (Sk.)
Transactions Royal Society Tropical Medicine & Hygiene, 782, 783 (Lab.)
Transvaal Education Department, 284 (Mal.)
Trasler, G., with Mackie, 736 (Chl.), 701 (Dys.), 770 (Lab.)
Trémolières, F., & Caussade, L., 859 (Mal.)
Treston, M. L., 606 (Misc.)
Tripputi, V., 354 (Und.)
Trout, C. L., 504 (S.S.)
Tscherning, 694 (Dys.)
Tsen, E. T. H., 741 (Chl.)
Tsuchihashi, K., 336 (Dys.)
Tsuda, K., with Kamimura, 739 (Chl.)
Tsukiye, S., 760 (Bb.)
Tsykalas, 214 (Hel.)
Tucker, C., 525 (Misc.)
Tupas, A. V., 410, 757 (Bb.), 765 (Sc.)
Turkhud, D. A., & Avari, C. R., 594 (Lep.)
Twort, F. W., 44 (Dys.)

U

Ubaldo, A. R., 64 (Oph.)
Uchida, M., 594 (Lep.)
Ujihara, K., & Rokkaku, T., 412 (Bb.)
Umeno, S., & Doi, Y., 523 (Misc.)
Unger, L. J., with Hess, 421 (Sc.)
Union of S. Africa, Miners' Phthisis Board, 399 (Tb.)
Unna, P. G., 787 (Lab.)
——, & Wissig, E. T., 158 (S.S.)
Urechia, C. I., 863 (Mal.)
Uriarte, L., (376), 726 (Pl.)

V

Vaccarezza, R. F., 30 (Am.)
——, with Finochietto, 28 (Am.)
——, Inda, F. F., & Posse, R., 897 (B.R.)
Vallet, 238 (Hel.)
Valverde, B., 390, 391 (Lep.)
Vance, E. B. M., 497 (Z.)
van den Branden, F., 508, 881 (S.S.)
——, & van Hoof, 556 (R.F.), 870 (Mal.), 881 (S.S.)
van der Hoeven, J., 26 (Am.)
van der Togt, A. C., 32 (Am.)
Vassallo, S. M., with Marshall, 141 (S.S.)
Vecki, M., with Fleischner, Shaw & Meyer, 350 (Und.)
Vedder, E. B., 417, 764 (Sc.)
Vegas, M., 209 (Hel.)
Vergne, E., 567 (Y.F.)
Vervoort, H., 786 (Lab.)
Vevers, G. M., 245 (Hel.)
Vialatte, Ch., 299 (Mal.)
——, & Parrot, L., 484 (Z.)
Villa, L., 862 (Mal.)
Vincens, 606 (Misc.)
Vincent, H., 340 (Dys.), 559 (R.F.)
Violle, H., 331 (Dys.)
Vlok, A. M., 846 (Z.)
Voegtlin, C., & Miller, D. W., 883 (S.S.)
Vogel, R., (499) (Z.), (672) (Hel.)

W

Wadsworth, A., Langworthy, H. V., Stewart, F. C., Moore, A. C., & Coleman, M. B., 561 (Jaun.)
Wagner, C. E., with Creighton & Davison, 42 (Dys.)
Walch, E., 823, (850) (Z.)
——, & Walch-Sorgdrager, G. B., 286, 856 (Mal.)
Walch-Sorgdrager, G. B., with Walch, 286, 856 (Mal.)
Walker, R. R., 384 (Chl.)
Wallace, A. F., 349 (Bl.), 616 (Misc.)
Wallace, H. E., 672 (Hel.)
Wallace, J. C., & Grant, M., 668 (Hel.)
Wallman, D. R., 497 (Z.)

Walravens, P., 787 (Lab.)
——, with Mouchet & van Nitsen, 87 (Misc.)
Walsh, J. H. T., 541 (Pl.)
W[alshe], F. M. R., 409 (Bb.)
Warren, S., 153 (S.S.)
Warthin, A. S., 686 (Am.)
Wasilewski, A., 373 (Pl.)
Wassell, C. M., with Faust, 458 (Z.)
Wassilewsky, W. J., with Yakimoff, 513, 518 (S.S.)
——, with ——, Korniloff & Zwieshoff, 467 (Z.)
——, with ——, & Solowzoff, 464 (Z.)
Watanabe, R., 699 (Dys.)
Watanabe, Y., Kawai, J., & Watanabe, H., 384 (Chl.)
——, Kawatani, M., & Watanabe, H., 384 (Chl.)
Watch, N. B., 679 (Am.)
Waters, E. E., 447 (B.R.)
Waterston, J., 483, 828 (Z.), 898 (B.R.)
——, with Wenyon, Anderson, McLay & Hele, 889 (B.R.)
Watkins, 437 (Misc.)
Watkins, V. E., 440 (Misc.)
Watkins-Pitchford, W., 78, 615 (Misc.)
——, Irvine, L. G., & Smith, J. M., 401 (Tb.)
Watson, O. P., 69 (Fev.)
Waugh, T. R., 772 (Lab.)
Wayson, J. T., 398 (Lep.)
Weichbrodt, R., 133 (S.S.), 322 (R.F.)
Weidman, F. D., & McMillan, T. M., 597 (Der.)
Weill, E., Arloing, F., & Dufourt, A., 761 (Bb.)
Welchman, W., & Pirie, J. H. H., 164 (Der.)
Wells, A. H., 411 (Bb.)
Wells, R. W., Bishopp, F. C., & Laake, E. W., 471 (Z.)
Wenyon, C. M., 1 (K.A.),19 (Am.), 136 (S.S.), 182, 305 (K.A.), 277 (Mal.)
——, Anderson, A. G., McLay, K., Hele, T. S., & Waterston, J., 889 (B.R.)
Werlé, W., 342 (Dys.)
Wesenberg-Lund, C., 111 (Z.)
White, H. F., 376 (Pl.)
Wickliffe, R., 900 (B.R.)
Widal, F., Abrami, P., & Hutinel, J., 683 (Am.)
——, with Roger & Teissier, 804 (B.R.)
Wierzbicki, B., with Jezierski, 337 (Dys.)
Wiggins, C. A., 344 (Bl.), 875 (S.S.)
Wildish, G. H., 397 (Lep.)
Williams, F. E., with Patterson, 48, 697 (Dys.)
Willis, H. H., 246 (Hel.)
Willmore, J. G., 77 (Misc.)
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American Journal of Tropical Diseases and Preventive Medicine (*New Orleans*)	1913–16	Vols. 1–3
American Society of Tropical Medicine (*Transactions*) (*New Orleans*) ..	1904–14	Vols. 1–9
Journal of the London School of Tropical Medicine (*London*)	1911–13	Vols. 1–2
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